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FACTORS OF UNSUSTAINABILITY AND OVEREXPLOITATION IN MARINE FISHERIES

Views from the southern Mediterranean, West Africa, Southeast Asia and the Caribbean

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Views from the southern Mediterranean, West Africa, Southeast Asia and the Caribbean

by

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PREPARATION OF THIS DOCUMENT

In 2001, project GCP/INT/788/JPN, was initiated by FAO, with financial support from the Government of Japan. The aim of the project was to address issues related to factors of overexploitation and unsustainability in fisheries, as a way to improve the framework for the implementation of international fisheries instruments.

Within the framework of this project, three international workshops were held in order to review the implementation of international fisheries instruments and to attain a worldwide overview of what factors contribute to unsustainability and overexploitation in fisheries. These workshops were held over a three-year period in: Bangkok, Thailand, from 4 to 8 February 2002 ("the Bangkok Workshop")[1]; Mauritius, from 3 to 7 February 2003 ("the Mauritius Workshop") [2]; and Siem Reap, Cambodia, from 13 to 16 September 2004 ("the Siem Reap Workshop")[3].

After the completion of these international workshops, two technical papers were prepared – one summarizing the conclusions of the workshops (Appendix A of this document) and one on the methodological framework within which the discussions had taken place (Appendix B of this document).

In order to attain a regional perspective on factors of overexploitation and unsustainability, particularly in relation to the specific issues or the constraints and opportunities facing developing countries, the technical papers mentioned above were used as a basis for discussion at three regional workshops:

The first workshop on regional factors of unsustainability was held in Dakar, Senegal, from 28 November to 1 December 2005 (the Dakar Workshop)[4], and focused on the southern Mediterranean and West Africa.

The second regional workshop was held in Bangkok, Thailand, from 13 to 16 November 2006, and focused on Southeast Asia.

The third regional workshop was held in Bridgetown, Barbados, from 6 to 8 December 2006, and focused on the Caribbean.

This document contains the reports of these workshops, including overall conclusions and recommendations. The document was compiled and edited by Clotilde Bodiguel, FAO Consultant; Dominique Gréboval, FAO Senior Fishery Planning Officer and Technical Secretary of the Workshops; and Jean-Jacques Maguire, FAO Consultant.

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[1] The report of the Bangkok Workshop is published in FAO Fisheries Report No. 672, "Report and documentation of the International Workshop on Factors Contributing to Unsustainability and Overexploitation in Fisheries, Bangkok, Thailand, 4–8 February 2002", Gréboval, ed., http://www.fao.org/DOCREP/005/Y3684E/Y3684E00.HTM

[2] The report of the Mauritius Workshop is published in FAO Fisheries Report No. 700, "Report and documentation of the International Workshop on the Implementation of International Fisheries Instruments and Factors of Unsustainability and Overexploitation in Fisheries. Mauritius, 3–7 February 2003", Swan and Gréboval (comps.), http://www.fao.org.DOCREP/007/y5242e/y5242e.00htm

[3] The report of the Siem Reap Workshop is published in FAO Fisheries Report No. 782 "International Workshop on the Implementation of International Fisheries Instruments and Factors of Unsustainability and Overexploitation in Fisheries, Siem Reap, Cambodia, 13–16 September 2004" Swan and Gréboval (eds). http://www.fao.org/DOCREP/009/A0312E/A0312E00.HTM

[4] The report of the Dakar workshop is published in FAO Fisheries Report No. 822 "Rapport et documents de l'Atelier régional sur les facteurs de non durabilité et de surexploitation des pêches maritimes, Dakar, Sénégal, 28 novembre-1er décembre 2005" Gréboval and Maguire (éds.).

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ABSTRACT

With financial support from the Government of Japan, an FAO project was initiated in 2001 to address issues related to factors of overexploitation and unsustainability in fisheries, as a way to improve the framework for the implementation of international fisheries instruments.

Within the framework of this project, three international workshops were held in order to review the implementation of international fisheries instruments and to attain a worldwide overview of what factors contribute to unsustainability and overexploitation in fisheries. Further, in order to attain a regional perspective on such factors, particularly in relation to the specific issues or the constraints and opportunities facing developing countries, three regional workshops were held focusing on the southern Mediterranean, West Africa, Southeast Asia and the Caribbean.

This document contains the reports of these regional workshops, including supporting technical documentation.

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PREFACE

Over the last 20 years, the marine fishery resources of the world have been increasingly subjected to overexploitation, detrimental fishing practices and environmental degradation. The phenomenon now affects a majority of fisheries worldwide, with very severe consequences in terms of resource unsustainability, massive economic waste, increasing social cost and food insecurity.

Over the past 15 years, the international community has become increasingly aware of this situation. Globally, a number of major legal instruments have been developed to address the management of marine fisheries. Among these are: the 1995 FAO Code of Conduct for Responsible Fisheries, the 1995 UN Fish Stocks Agreement and more recently the International Plan of Action for the Management of Fishing Capacity and the International Plan of Action on Illegal, Unreported and Unregulated Fishing. Regional fisheries management organizations have also been strengthened, with a number of new ones having been created.

Yet the effective implementation of these instruments appears to be a slow and difficult process. There is seldom an international fisheries forum that does not call for increased determination to implement these instruments to halt and eventually reverse the present trend of resource depletion. This call was renewed in Johannesburg at the World Summit on Sustainable Development. However, because the factors contributing to fisheries overexploitation and unsustainability are still not widely understood, effective implementation of the instruments has proven difficult.

This document contains the conclusions and recommendations of workshops aimed at identifying regional factors contributing to fisheries overexploitation and unsustainability and how they affect the implementation of international fisheries instruments.

ACRONYMS

CLME	Caribbean Large Marine Ecosystem
COMHAFAT	Ministerial Conference on Fisheries Cooperation among African States Bordering the Atlantic Ocean
CRFM	Caribbean Regional Fishery Mechanism
DPSR	Driving forces-Pressure-State-Response framework
GFCM	General Fisheries Commission for the Mediterranean
IPOA	International Plan of Action
IPOA–Capacity	International Plan of Action for the Management of Fishing Capacity
IPOA–IUU	International Plan of Action to prevent, deter and eliminate illegal, unreported and unregulated fishing
ITQ	individual transferable quota
IUU fishing	illegal, unreported and unregulated fishing
MCS	monitoring, control and surveillance
MEY	maximum (or optimum) economic yield
MPA	marine protected area
MSY	maximum sustainable yield
NGO	Non-governmental Organization
PIP analysis	policies, institutions and processes analysis
RFMO	regional fisheries management organization
SEAFDEC	Southeast Asian Fisheries Development Centre
SL	sustainable livelihoods
SWOT analysis	strengths, weaknesses, opportunities, and threats analysis
TAC	total allowable catch
TCP	Technical Cooperation Programme
UNCLOS	United Nations Convention on the Law of the Sea
WECAFC	Western Central Atlantic Fisheries Commission
WSSD	World Summit on Sustainable Development

PART 1

REGIONAL WORKSHOP ON FACTORS CONTRIBUTING TO THE UNSUSTAINABILITY AND OVEREXPLOITATION OF MARINE FISHERIES IN THE SOUTHERN MEDITERRANEAN AND WEST AFRICA

Dakar, Senegal, 28 November–1 December 2005

1. INTRODUCTION

The first regional workshop organized within the framework of the FAO project GCP/INT/788/JPN was held in Dakar, Senegal, from 28 November to 1 December 2005. It was attended by a diversified group of researchers and administrators, invited in their personal capacity and not as representatives of their countries, in an effort to cover all aspects of fisheries. During the workshop's opening session, participants observed one minute's silence in memory of the recently deceased Mr Bernard Dior, who was to have participated in the workshop.

Mr Amadou Ouattara, FAO Representative in Senegal, welcomed the participants on behalf of FAO's Director-General and the Assistant Director-General for Fisheries. He warmly thanked the Senegalese Government for hosting the workshop, stressed that sustainable development required new approaches and a break with the past if the fisheries sector was to emerge from the impasse in which it now found itself. He assured the participants that FAO would continue to support reform and the implementation of the Code of Conduct for Responsible Fisheries. He was convinced that the workshop discussions would make a contribution toward sustainable fisheries and food security.

Mr Maham Dialo chaired the workshop's opening ceremony on behalf of the Minister for the Marine Economy and International Maritime Transport responsible for fisheries in Senegal. Senegal, he said, was grateful and honoured to have been chosen to host a workshop dealing with one of the great challenges of our time. He described Senegal's efforts to adjust its fishing capacity to the productivity of the resources and stressed the importance of taking social, economic and environmental factors into account. He congratulated FAO for the support it provided to member countries.

The aim of the workshop was to address the factors contributing to the unsustainability and overexploitation of West and North African fisheries.

The workshop focused attention on:

1. the main factors of unsustainability and overexploitation;
2. the main approaches to and ways of solving the problems;
3. the difficulties and obstacles facing the States and the regional fisheries organizations in the implementation of existing international legal instruments; and
4. ways of overcoming those difficulties and obstacles.

The workshop sought to identify specific conclusions and recommendations, focusing particular attention on public policy considerations concerning:

- support for coastal fisheries management and the implementation of international legal instruments by developing countries;
- the need to amend or strengthen such instruments and existing public policies; and
- the identification of urgent management and conservation measures.

The first day was devoted to general presentations about the project, the main conclusions and recommendations of previous workshops, and a methodological discussion.

The workshop agenda and the list of participants are provided in Annex 1 and Annex 2, respectively.

2. REPORT OF THE NORTH AFRICA GROUP (MEDITERRANEAN)

2.1 Identification of factors of unsustainability

The North Africa group focused its attention on the factors contributing to fisheries' unsustainability in the Mediterranean. The factors identified at previous workshops were confirmed and a slightly modified order of priority drawn up:

1. Strong demand for limited resources
2. Poor governance
3. Complexity and lack of data
4. Failure of institutions and policies
5. Inappropriate incentives
6. Interaction with other sectors and with the environment
7. Poverty and lack of alternatives

Factors 3 to 7 were considered to be closely related to poor governance, taken in its widest sense. The group introduced a new category "failure of institutions and policies", which it considered one of the main factors contributing to poor governance.

The group then listed the factors contributing to fisheries unsustainability within each category and noted some characteristics specific to the Mediterranean which should or could be taken into account in the search for solutions.

2.1.1 Strong demand for limited resources

Almost all species in the Mediterranean were subject to strong demand by national and regional markets. The trend was one of rising demand due to various factors, such as increased purchasing power, food preferences and dietary requirements.

The area surrounding the Mediterranean was also characterized by a large "tourist restaurant"-type market which paid high prices, mainly for fresh fish, and was a constant incentive to fishermen to fish.

In addition to strong national and local demand, there was also regional and international demand for some high commercial value species.

This strong demand, which was not controlled through appropriate management of fishing capacities, had led to a generalized fleet overcapacity and to overfishing, highlighted by declining catches worldwide. In addition, it was to be noted that trade took place freely in the region and it was there, i.e. in the region, that market-related solutions needed to be found.

The group recognized the complexity intrinsic in the four components of fisheries sustainability (bio-ecological, economic, social and institutional), which made management a more uncertain and difficult process.

Nevertheless, the perception that complexity hampered management activities and affected the success of management measures was often due to lack of knowledge, as much as or more than to the scale and impact of the complexity itself.

The expression "lack of knowledge" had two meanings here, and both had to be dealt with:

(i) knowledge gaps, especially with regards to fisheries' social and institutional aspects; and
(ii) problems of sharing and transferring existing data in a form suitable for and easily understood by the various players.

The group wished to stress the need to reduce this lack of knowledge so that the complexity of fishery systems could be seen in its proper perspective and dealt with accordingly, rather than used as an excuse to protect interests, to fail to take action or to avoid examining actual management problems. In other words, it was necessary to understand that the complexity inherent in fisheries was not in itself the crux of the problems encountered.

2.1.2 Failure of institutions and policies

The policies (and laws) of many countries were out of date. They no longer related to actual problems, nor did they take account of the current approaches being promoted for sustainable fisheries management. This disparity was in itself a source of unsustainability.

Also, fisheries were not often treated as an economic sector like all the others. Whether it was considered as a poor sector for poor people, a provider of jobs of last resort, or an area where breaching the law was tolerable, fisheries was often covered by a special regime, based on a perception that was out of step with the realities and constraints of the sector, and this contributed to its unsustainability.

All these disparities were reflected in the way management services were organized and in the institutions, which were often incapable of coping with substantive problems, management principles and aims.

The group also noted that the
management unit in the fisheries sector was not always properly set up; it was sometimes undefined, or insufficiently formalized in institutional, legal and operational terms, despite recent efforts by the General Fisheries Commission for the Mediterranean (GFCM).

Mediterranean fisheries were also seriously affected by failure to apply the rules and regulations, partly due to the false perception of the sector and its economic and social role.

Management was still essentially based on the sector's bio ecological component, to the detriment of the other components of sustainability.

The final observation was the lack of political will as shown in the way fisheries management was designed and implemented. Political will was all the weaker because the consultation frameworks were often poorly designed or inappropriate. This perceived lack of political will was as much a cause as a consequence of the failure of management mechanisms.

It was also noted that there was still little demand by civil society for better governance, even though there had recently been some improvement.

2.1.3 Inappropriate incentives

Many incentives were inappropriate. However, the group singled out four whose impact on fisheries unsustainability in the Mediterranean seemed particularly strong.

Given the "special regime" applying to fisheries, i.e. it was not considered an economic sector like the others, market-related incentives were often wrongly interpreted and poorly regulated or unregulated.

In a situation of generalized fleet overcapacity, subsidies granted to the sector were too often still being channelled, directly or indirectly, to the purchase of fisheries inputs.

More generally, it was to be noted that the management system tended to encourage fishermen to behave irresponsibly, even when they had *de facto* rights to the resources or rights of access to the resources, which gave them a certain number of guarantees for the continuity of their activity.

An example of negative incentives was the failure to apply the rules, regulations and penalties – a situation which, *de facto*, encouraged fishermen to flout the law. The sector's distorted representation, mentioned above, often gave rise to the attitude that fisheries fraud was really of little consequence.

Finally, the group noted that some Non-governmental Organizations (NGOs) (not specialized in fisheries) sometimes intervened inappropriately in government decisions and interacted negatively in fisheries management efforts. What was needed was better coordination and the incorporation of measures having an impact on fisheries and fisheries management.

2.1.4 Interactions with other sectors and with the environment

The group thought that, except in the case of interactions between aquaculture and fisheries, which were important in the Mediterranean, other interactions did not play a crucial role in terms of unsustainability. However, the group made two general comments:

(i) the absence of a clear vision for the fisheries sector and of the contribution it could objectively make to a country was a disadvantage when a decision placed it in competition with other activities. The political choice often fell to the activity perceived as more economically viable, which was rarely the case with fisheries. The trade-off between activities and the evaluation of negative and positive effects was even less objective given that the perception of fisheries was a distorted one;

(ii) the group noted the negative effects of the inconsistencies between:

- development, conservation and management policies
- different levels of policy: national, regional and international.

A number of less important comments on the question of interactions were made:

- conflicts between small-scale fisheries and trawler fisheries almost always turned to the advantage of the latter;
- there were often differences, not to say inconsistencies, between "fisheries objectives" and "environmental objectives". There was also a need for co-management between ministerial administrative departments;
- industrial pollution, maritime transport (e.g. oil tankers), sand extraction and the appearance of new exogenous species in the Mediterranean were all factors or activities likely to exacerbate fisheries unsustainability and, consequently, could not be ignored.

2.1.5 Poverty and lack of alternatives

Poverty and the lack of alternative employment could be important, even dominant, factors locally, but they were not predominant in the wider Mediterranean. On the other hand, they were often the reason given at national level for poor fisheries management and governance.

2.2 Finding solutions to unsustainability factors

The Mediterranean group identified the following solutions to the factors of unsustainability:

- promote an accurate and up-to-date perception of the sector;
- treat the fisheries sector in the same way as the other sectors;
- ensure transparency in management and decision-making;
- promote and put into operation management (co-management) units better qualified to deal with the problems identified;
- support participatory planning based on principles such as participation, transparency, visibility and education;

- support and ensure the participation of the main stakeholders;
- apply at national and regional levels the Code of Conduct for Responsible Fisheries, especially the International Plan of Action for the Management of Fishing Capacity (IPOA–Capacity) and the International Plan of Action Plan to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (IPOA–IUU);
- promote regional fisheries management organizations (RFMOs) and, generally speaking, more effective regional cooperation for shared stocks;
- manage subsidies and other economic and tax incentives for responsible fisheries;
- evaluate wealth creation and distribution in an effort to achieve more effective, transparent and equitable fisheries management;
- promote the introduction of "rights" and other incentives to encourage responsible behaviour in the industry;
- analyse the "rights" regime in conjunction with the income from the fisheries and the distribution of that income and, on that basis, promote rights and related obligations;
- where "informal rights" exist, examine the possibility of institutionalizing these rights and the related obligations;
- audit and reconcile the research with decision-making requirements; there is a need for operational, multidisciplinary research for use by the management units;
- promote research and multidisciplinary, systemic and ecosystemic approaches;
- support and improve the effectiveness of the monitoring, control and surveillance system (MCS);
- provide training for and develop the skills of all players in the management service (e.g. reconcile training for fishermen with the needs of the sector, bearing in mind the potential for wealth creation and resource renewal);
- examine the relations and interactions between fisheries and aquaculture in the Mediterranean (e.g. future prospects, internal and external unsustainability);
- understand the social aspects of fisheries so as to act in full knowledge of the facts (considering fisheries in the same way as the other sectors).

2.3 Difficulties and obstacles facing fisheries organizations in the implementation of international legal instruments

The obstacles and solutions relating to the implementation of international instruments were summarized as follows:

1. at national level, the States were not organized well enough and did not act quickly enough to address, examine and implement international instruments;
2. regional fisheries organizations did not provide sufficiently efficient links between national and international levels for the implementation and effective, on-going monitoring of international instruments;
3. there was a lack of monitoring and support by the specialized international organizations for the implementation of these instruments, especially in the developing countries.

The following major obstacles and difficulties were identified:

- politicians' lack of knowledge of and interest in the fisheries sector hindered the implementation of international legal instruments;
- the (too) rapid introduction of several international legal instruments in quick succession made the acceptance and dissemination of the various tools and approaches difficult;
- the reluctance of the regional fisheries organizations (RFO) and the States to find out what these instruments proposed and could bring to a particular situation perhaps explained the authorities' lack of acceptance of and planning for the implementation of these instruments, e.g. through an international instrument monitoring committee;

- the fisheries authorities in some countries were weak and too poorly organized to take these instruments in hand; the politicians, on the other hand, were not always aware of the existence of these instruments;
- difficulties and the lack of acceptance of these instruments other than by the authorities was a major problem; in particular, steps needed to be taken to raise the industry's awareness of these instruments and the positive role they could play;
- regional monitoring of the implementation of international legal instruments was patchy, at best;
- implementation of the instruments in the countries of the region was not coordinated and this posed a problem where some instruments were concerned, e.g. capacity management for shared stocks;
- RFO budget constraints sometimes seriously restricted implementation of these instruments.

3. REPORT OF THE WEST AFRICA GROUP (ATLANTIC)

3.1 Identification of the factors of unsustainability

The West Africa group focused attention on the unsustainability factors pertinent to its region. The categories of factors identified at previous workshops were confirmed, but reformulated and given a different order of priority:

1. lack of good governance
2. strong demand for limited resources
3. complexity and lack of knowledge
4. inappropriate incentives
5. poverty and lack of alternatives
6. interaction with the other sectors and with the environment

Of these factors, strong demand for the resources, brought about by pressure exerted by fishing agreements with third countries, and lack of good governance were identified as particularly relevant in West Africa. In addition to a lack of clear regional and national fishery policy objectives, and the ambiguous links between the various players due to the sector's complexity and lack of integration, pressure brought about by fishing agreements was perceived as a major cause of unsustainability. However, subsidies to the fisheries sector, open access, illegal migration of fishermen, and illegal, unreported and unregulated fishing were also factors of unsustainability.

More specifically, the West Africa group concluded that in addition to the lack of good governance, failure to apply the appropriate national rules and regulations, and failure to include international agreements in national policies were factors of unsustainability specific to the subregion. The fisheries sector was very dynamic and the arrival of new players/investors (outsiders or persons not previously involved in fisheries) for purely short-term economic reasons, due to the free movement of capital, exacerbated the problems of overcapacity, e.g. the exporting of the overcapacity of other regions to the sub-region. Fisheries was a profitable sector. However, the income it generated was not allocated to the institutions needed to promote sustainability (fisheries research, management, monitoring or control).

The lack of mechanisms to regulate access to the resources, the fact that fisheries management was based on too-short time scales related to electoral processes rather than ecosystemic processes, the lack of regional coordination, vague management objectives and the lack of integration of the fisheries sector with other sectors of the environment were all important factors in the subregion. The need to redefine poverty in terms of exclusion and vulnerability rather than in monetary terms was stressed. The group also stressed politicians' poor use of, or failure to use, research results and the failure to assimilate and make the best possible use of available knowledge. Oil exploitation might be an important source of income for a country, but for fisheries it could pose a number of problems at every

stage of development of the oil sector: prospecting, exploitation and transport. These activities could impact on the quality of the environment, the health of the resources, the zoning of the fishery, etc. The improved living standards resulting from oil exploitation would probably lead to a rise in demand for marine products and also to a loss of interest by potential players in the fishery sector.

Poverty (exclusion and vulnerability) and the lack of alternatives were a consequence of poor governance rather than an independent factor of unsustainability.

3.1.1 Lack of good governance

The lack of good governance had a number of closely-related consequences. It increased the negative effects on all the components of sustainability, due to the pressure exerted by fishing agreements and the influx of outside capital. Because fishery policy objectives were wrongly prioritized and because of a lack of national and regional coordination of fisheries policies, the latter two factors led to overcapacity which, combined with insufficient control of access, increased illegal fishing.

The lack of good governance was also the cause of poor relations between the players, lack of scientific support to fisheries management and to the sector in general, failure to take account of management advice by the authorities or the sector, failure to allocate financial, human and material resources to the sector or the poor use made of them when they were allocated, and lack of knowledge of the sector. The lack of good governance prevented the sector from becoming more efficient and led to the adoption of inappropriate rules and regulations and to failure to apply them when they were appropriate.

3.1.2 Strong demand for limited resources

In a system of good governance, strong demand for limited resources is an asset and should benefit the sector exploiting those resources. However, in a context of poor governance, strong demand brought with it an influx of outside capital, illegal fishing and negative consequences affecting all four components of sustainability. Strong external demand destroyed intraregional trade and could reduce food security. Some of these negative effects could be mitigated if increased intraregional trade was made an objective of fisheries policies and encouraged through the establishment of marketing channels.

3.1.3 Complexity and lack of knowledge

Complexity and lack of knowledge, combined with poor governance, made responsible decision-making more complicated. Some players cited the need for resource conservation in a context of a precautionary approach to restrict fishery activities, perhaps needlessly, whilst others promoted unbridled development that the resources were probably unable to sustain. These seemingly different objectives quickly led to a deterioration of relations between players. In a context of good governance where the players trusted each other and acknowledged that they shared common, long-term objectives, all interested parties would know their roles and responsibilities and would work together to achieve sustainable fisheries development.

At the present time, too little was known of people's aspirations to be able to predict the influx of human resources through the migration of fishing populations.

3.1.4 Inappropriate incentives

Inappropriate incentives were one of the main causes of overcapacity, itself due to the influx of outside capital. The absence of secure fishing rights eroded operators' confidence and resulted in preference being given to maximizing short-term profits rather than to sustainable long-term exploitation. Inappropriate incentives and scant recognition for the sector also resulted in failure to add value to catches.

3.1.5 Poverty and lack of alternatives

Poverty and the lack of alternatives were causes of the unpredictability of human migration and of failure to add value to catches.

3.1.6 Interaction with other sectors and with the environment

The failure to recognize the fishery sector's importance for the national economy and for food security due, *inter alia,* to a lack of intersectoral coordination, resulted in habitat destruction for urbanization, tourism development, oil exploitation and the allocation of important fishing grounds to other activities such as aquaculture. The environment also had considerable influence on the development of fishery resources. This aspect was often better understood in North and West Africa than in Europe and North America, where fishing was often perceived as the only important factor in the development of fishery resources.

The lack of recognition of the sector made for difficult relations between players in the fisheries sector and those in other sectors.

3.2 Finding solutions to unsustainability factors

The West Africa group placed most of their proposed solutions under the heading "lack of good governance". These proposed solutions covered complexity and lack of knowledge, inappropriate incentives, and poverty and lack of alternatives. Strong demand for limited resources and interaction with other sectors and with the environment were dealt with separately, even though they could well have been included under the same heading.

3.2.1 Lack of good governance

Good governance is typified by openness, or transparency, participation, accountability, effectiveness and consistency.

Skills development for all stakeholders, the identification and definition of the roles and responsibilities of each stakeholder and the setting up of an integrated consultation framework to ensure free and full circulation of available data should help solve the problems relating to the lack of scientific support for management and the failure of management to take account of scientific advice. Such measures would improve relations between all stakeholders, compensate for the lack of funds and political will and make the possibility of bureaucratic and authoritarian management more unlikely.

Such measures would make for a strong management system, with well-defined objectives set out in order of priority in a specific fisheries policy incorporating modern principles of good fisheries management as defined in international agreements, and backed by stakeholders with improved skills, able to turn the fisheries agreements to good account. They would also allow common conditions for negotiating fishing agreements with third countries to be defined. However, the group accepted that the obstacles were often people-related and that there was a need to improve negotiating skills.

Improved governance would make it possible to establish effective mechanisms to control access. It would also allow illegal fishing to be controlled through improved cooperation between the States and the tightening of monitoring and surveillance. The West Africa group identified a need to strengthen existing regional institutions. It suggested evaluating the cost and benefits of regional coordination in a bid to raise the awareness of decision-makers and other interested parties of the benefits such coordination provided. Improved regional coordination required the establishment of national consultation frameworks, including all interested parties (or stakeholders) who would define the national positions for discussion with regional coordination bodies.

The group thought it was important to update the rules and regulations and bring them into line with modern standards of management and cooperation with regional coordination bodies through open, participatory, well-integrated and effective processes. Allocation of a larger proportion of the income that national governments obtained from the fisheries sector would provide more substantial funds for fisheries management.

Improved data-sharing in a context of improved governance would give all interested parties a better understanding of the problems relating to overcapacity and would naturally lead to the formulation and implementation of national and regional capacity management plans (e.g. vessel registration). In this context, it was important that the interested parties had a clear understanding of their roles. In particular, scientists and fisheries management, in partnership with other interested parties, had to try to find solutions acceptable to all, rather than impose foreign models which were perhaps unsuited to local conditions. In this context, it was particularly important that all stakeholders received training to be able to work effectively in reformed, flexible, strong and resilient institutions.

3.2.2 Strong demand for limited resources

As mentioned above, in good governance systems, strong demand for limited resources can be an asset for the fisheries sector. In order to improve food security and add value to all catches, the group recommended that fishery policy objectives should include increased trade and, to this end, marketing systems should be established.

3.2.3 Interaction with other sectors and with the environment

Urbanisation, industrialization, tourism and aquaculture development were all threats to fisheries in that they destroyed or changed habitats, or competed with the fisheries sector for space. The group stressed the need for national and regional authorities to recognize the importance of fisheries for the national economies and for food security. Improving intersectoral coordination seemed to be one of the main ways to achieve more recognition for the sector. However, it was also necessary to reconcile the different objectives of the various ministries involved (e.g. the Ministry for the Economy would like investment, whilst the Ministry of Tourism would like to develop the hotel sector).

3.2.4 Summary

To sum up, the West Africa group thought that in order to eliminate the factors contributing to unsustainability it would be necessary to:

- integrate public policies (coordination between the environment, the economy, fisheries and tourism);
- improve the skills of all stakeholders (i.e. those involved in administration, research and the industry, as well as civil society and subregional institutions);
- introduce transparent, participatory (including all stakeholders), effective, accountable and well-integrated fisheries management processes, and the means needed to implement them;
- take regional and international instruments into account;
- enhance the roles and function of regional cooperation and integration organizations;
- promote fishery products, including the use of market incentives (reduction of losses, certification-approval);
- equitably distribute the profits obtained from fisheries.

3.3 Difficulties and obstacles facing fishery organizations in the implementation of international legal instruments

The West Africa group recognized the numerous obstacles and difficulties to be overcome before the solutions identified above could be implemented. As some of these obstacles had not been mentioned before, this section describes the difficulties and obstacles as well as the proposed ways to avoid or get round them. Most of the difficulties and obstacles were related to human or institutional factors. Therefore, the solutions often involved the provision of training for the interested parties, institutional reform to encourage data-sharing and joint decision-making using transparent, participatory, effective and well-integrated procedures, with the stakeholders considered as equal partners.

The shortage of funds, the lack of political will and the existing institutional framework, whereby the research institutes were independent, with each preparing its own action plans, might deprive fisheries management of the scientific support it needed. The allocation of research funding to the fisheries management body, who could then have the research carried out by the national institute or by another body, would enable fisheries management to obtain the support it needed and, at the same time, breathe new life into the research institutes by encouraging competition. It would also be possible to solve the problem of lack of support for management by involving all the stakeholders in the identification and definition of the research topics. Making the decision-making process more transparent, publishing scientific advice as soon as it was given to the decision-making authorities and making it compulsory for those authorities to explain their management decisions relative to the advice would make for more transparency. The group wished to see the Ministerial Conference on Fisheries Cooperation network (COMHAFAT) made more dynamic.

The problem of fishing agreements with third countries was more complicated because the content of the agreements were often not divulged, the obstacles were people-related and the agreements had political as well as technical and financial aspects. Solving the problems relating to fishing agreements required better regional coordination, better negotiating skills and a more transparent negotiating process.

4. CONCLUSIONS AND RECOMMENDATIONS

- The workshop was of the opinion that the types of factors of unsustainability identified at previous workshops were generally pertinent even though their respective importance might differ from region to region.
- The workshop acknowledged the pertinence of the project's approach and the need to promote and pursue this type of discussion and analysis at national level and within the competent regional organizations. It also stressed that the expert analysis techniques (Delphi, nominal group technique and cross-border diagnostic analyses), were particularly appropriate to promote discussions on the governance and management of the fisheries sector and on marine ecosystem management generally.
- The approach was able to identify and deal with the causes of unsustainability, but not its consequences. This holistic and anticipatory approach to the factors of unsustainability avoided the pitfall of tackling fisheries management problems one by one.
- The countries of the regions concerned by the workshop were making the transition from a fisheries development/conservation model to a management/conservation model. They did not have at their disposal the modes of governance, the approaches, or the means and techniques to establish an effective management/conservation system. The workshop concluded that policies, institutions and legal instruments had to be examined and adapted to the new requirements.
- The workshop acknowledged the need to focus attention equally on the four components of sustainability (bioecological, economic, social and institutional). This would correct the erroneous perceptions held by the stakeholders, given the number of *a priori* assumptions

made about the sector (e.g. concerning income from work and from capital, the concepts of "fishing community" and "fishermen").

- The lack of good governance, the pressures exerted by the imbalances between supply and demand (very strong demand, many resources already overexploited and ecosystems altered or degraded), complexity and lack of data, and inappropriate incentives were identified as the four main types of factors contributing to unsustainability.

Sectoral governance

- The workshop thought it was essential for the major principles of good governance, i.e. transparency, participation, accountability, effectiveness and consistency, to be systematically taken into account and rigourously applied.
- Governance had to be based on a better understanding of the sector, identification of national objectives and the recognition of specific requirements, made necessary due to reliance on a natural resource that was not inexhaustible.
- Given its distinctive features, co-management was indispensable for governance of the sector.

Public policies and institutions

- The roles and responsibilities of the major stakeholders had to be clearly defined and coordinated to meet the needs of management and conservation.
- The mechanisms for interaction between research, the industry and the authorities, and monitoring, control and surveillance needed to be reviewed from time to time and, if necessary, revised in order to ensure efficient management and good governance.
- Consultation and co-management mechanisms had to be strengthened and made more effective.
- An appropriate and sustained effort had to be made to provide fisheries management training and skills development for all stakeholders. In this connection it was noted that the industry received less aid for fisheries management training than other stakeholders.
- Fisheries management aims had to be realistic and in line with sustainability requirements.
- It was vital that fisheries management involve the identification of the fisheries (fleet-stock combinations) that could be managed as homogenous units, the preparation of management plans, and the definition of the roles and responsibilities of the stakeholders, making it clear that accountability was key.
- FAO's Code of Conduct for Responsible Fisheries and the international action plans, especially those relating to capacity and to illegal, unreported and unregulated fishing had to be implemented effectively.
- Existing regional and subregional fisheries organizations had to be strengthened and others established for the areas not covered (e.g. northern Gulf of Guinea). It was also suggested that national consultation frameworks (including all stakeholders) be established or strengthened. They would define national contributions and strategies for discussion by regional coordination bodies.
- Relations between regional and subregional economic organizations and specialized regional and subregional organizations needed to be better coordinated in order to improve the synergy between them.

Complexity

- Each of the four components of fisheries sustainability (biological, economic, social and institutional) was complex in its own right. The perception of complexity was related to lack of knowledge and it was in the social and institutional areas where knowledge was most lacking. Improving the methods of transferring and sharing data so that they would

be easily understood by all stakeholders could help to reduce the negative effects of lack of knowledge and complexity.

- Complexity should not be used as an excuse to protect interests, to avoid examining actual management problems and identifying solutions (avoid making complexity the crux of the problems) or to fail to take action.

Incentives

- Subsidies and other economic and tax incentives had to be managed having regard for the essential requirements of responsible fisheries and fisheries sustainability
- "Rights" and other incentives had to be introduced to encourage stakeholders to behave responsibly.
- The links between "rights", income and allocation of income had to be examined and rights conducive to responsible and sustainable fisheries promoted.
- In cases where "informal" rights existed, institutionalizing such rights and related obligations had to be encouraged.
- Wealth created through fisheries (and wealth distribution) had to be used to improve the effectiveness, transparency and equity of fisheries management.

Implementation of international instruments

- At national level, the States needed to be better organized in order to be able to rapidly address, examine and implement such instruments.
- Regional fisheries organizations had to play a greater role as intermediaries between the national and the international authorities for the implementation and effective and continuous monitoring of international instruments.
- The specialized international organizations needed to step up their monitoring and donors needed to provide more support for the implementation of these instruments in the developing countries.

Guidelines

- The workshop recommended that guidelines be prepared to take account of the unsustainability factors and improve governance.

ANNEX 1

Agenda

(Dakar, Senegal, 28 November–1 December, 2005)

Monday 28 November (plenary) – 08.30–17.30

General presentation of the project "factors of unsustainability and overexploitation"

Presentation and discussion on main conclusions and recommendations of the project

Presentation and discussion on the approach and methods followed by the project

Tuesday 29 November (2 groups) – 08.30–17.30

Identification and discussion of main factors of unsustainability in the region

Identification and discussion of paths to solution for the region

Wednesday 30 November (2 groups) – 08.30–17.30

Identification and discussion on difficulties and obstacles for States and regional fishery bodies of the region to implement existing fisheries instruments

Discussion on way these difficulties and obstacles can be overcome

Thursday 1 December (plenary) – 08.30–17.30

Drafting and adoption of conclusion and recommendations

ANNEX 2

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PART 2

REGIONAL WORKSHOP ON FACTORS CONTRIBUTING TO THE UNSUSTAINABILITY AND OVEREXPLOITATION OF MARINE FISHERIES IN ASEAN COUNTRIES

Bangkok, Thailand, 13–16 November 2006

1. INTRODUCTION

The second regional workshop organized within the framework of the FAO project GCP/INT/788/JPN was held in Bangkok, Thailand, 13–16 November 2006. It was attended by 26 experts, in their personal capacity, representing a wide range of disciplines and experience.

Section 2 summarizes the discussion on the regional factors of unsustainability and possible paths to solution and Section 3 summarizes the discussion on international instruments. Section 4 presents the conclusion and recommendations of the workshop.

The workshop agenda and the list of participants are provided in Annex 1 and Annex 2, respectively.

2. FACTORS OF UNSUSTAINABILITY AND POSSIBLE PATHS TO SOLUTION

2.1 Lack of good governance

The workshop agreed that the lack of good governance[1] was at the heart of the poor success of fisheries management. The lack of good governance has several causes including the lack of political will to make difficult decisions, political interference inconsistent with policies, conflicting objectives of different agencies, overlapping mandates and lack of coordination. Insufficient and ineffective monitoring, control and surveillance also contributes importantly to the lack of good governance. Poor enforcement allows destructive aquaculture and fishing practices to take place. The workshop noted that community involvement can be helpful in improving monitoring, control and surveillance.

Management of the fisheries in the region are generally of the command and control types where decisions are made centrally and implemented locally. However, in large countries with large numbers of fishermen, implementation of fishery management has not met with the desired success under any of the components of sustainability. Community-based and co-management, if interested parties are properly trained in its usage, and if carefully and gradually implemented, is believed to hold promises for better success of fishery management. System inertia, however, can hinder progress towards improved governance.

In many countries, the fishery sector has a low profile. The potential contribution of the fishing sector to the national economy, however, is substantial if the fisheries were well managed under the four components of sustainability. Well managed fisheries in good governance systems would generate rent that governments could recover and share equitably within society.

Possible paths to solution to good governance management systems (including implementation) which are open, participative, inclusive, accountable, effective and equitable to achieve the four components of sustainability could start with extensive campaigns of awareness raising. Improved policy planning and programme evaluation should also be able to help to improve governance.

The workshop wondered if existing institutions in the region are appropriate for the new challenges of making the transition from fishery development towards conservation and careful management in a

[1] Good governance processes are open, participative, inclusive, accountable, effective and equitable.

sustainability framework. It also noted that in order to have systems that would qualify as good governance, national governments need to have adopted the principles of good governance, which is not always the case.

There is not a common understanding of what good governance means – people think that the problem is external, they do not realize that they could be part of the problem because of existing institutional arrangements – fishermen are not the only reason fishery management is not successful. How to communicate that institutions and their interrelationships may not be appropriate is not clear to stakeholders. Existing fishery management systems should be evaluated for compliance with good governance principles. The workshop noted that identifying the solutions to improved governance and effective fishery management may be easier than implementing those solutions.

2.2 Open access

In this region open access is a sufficiently widespread and serious problem to be considered on its own a factor of unsustainability. In the other workshops, open access was seen as a result of inappropriate incentives, compounded by the high demand for a limited resource.

Possible paths to solution include the gradual implementation of rights based fisheries through limiting access by licensing and community (group) user rights. Limiting access improves on economic sustainability, but people that wanted to become fishermen or those exiting the fishery have to find other jobs. Licensing schemes vary in types (tying licences to the boat or not) and scope (the licence can cover many characteristics of the vessel or not). Issuing a licence for different fisheries increases the complexity of the process.

Although some form of licensing does exist in all countries at the workshop, few of those appear to be restricting. To be useful, licensing should restrict entry as soon as the bioecological or economic components of sustainability appear to be jeopardized. If the conditions do not improve, a reduction in the number of licences may be necessary. Licensing is only useful if there is effective monitoring, control and surveillance.

The region could benefit from regional cooperation on each other's experience with licensing, but they could also learn from other areas that have longer experience. Licensing information can help in government planning and response, e.g. tsunami.

Assigning community user rights had been identified as desirable in the region but the legal and operational frameworks largely remain to be developed. Pilot projects did not have the possibility to exclude fishermen from other areas which decreased their effectiveness. It appears to be time to mainstream the idea as assigning user rights and community management is highly desirable.

2.3 Inappropriate incentives

Currently, many fisheries operate in response to incentives (economic and others) that promote unsustainable practices rather than sustainable ones: rules and regulations are poorly enforced and illegal activities are perceived to bring rewards rather than penalties. The workshop concluded that inappropriate incentives were mostly related to the absence of secure rights and to overcapacity. The workshop agreed that under good governance, inappropriate incentives would be a considerably smaller factor of unsustainability.

Possible paths to solution include effective monitoring, control and surveillance because it provides strong incentive to follow the rules and regulations. Compliance is a function of the probability of getting caught breaking the rules and the penalty that is assigned (e.g. losing the right to fish after three serious offences – three strikes you are out). Training judges and prosecutors in the new fishery law could be one way to increase penalties. Market measures such as encouraging consumers NOT to buy illegally caught fish or fish caught with destructive gear could also help. Co-management and

community management can help with compliance, but some form of deterrence will always be needed.

Secure rights, including the right to exclude at the community level, do provide incentives to improve on the economic and bio-ecological components of sustainability, but the rights have to be tight in order for fishermen to feel that they are not exploiting a common pool resources. With secure rights, right holders can discuss and decide what to do with their collectively owned resource.

From financial perspective, taxes and subsidies provide opposite incentives. Subsidies are incentive to fish more while taxes, appropriately administered, could provide incentives to fish less.

The workshop noted that improved management leading to larger stock size will increase the incentive for new participants to come in the fishery.

2.4 High demand for limited resources

Workshop one noted that demand for fish is seen as expanding for most markets, with sustainable supply becoming increasingly limited resulting in higher prices. The high prices provide an incentive, particularly in an open-access regime, for further fishermen to get in the fishery, even in fisheries that are already overexploited. Globalization, combined with an increasing world population, and with increases in disposable incomes means that the price of fish are likely to keep increasing.

In good governance systems, high demand for a limited resource would be considered an asset, not a factor of unsustainability.

The attribution of secure rights was considered a possible path to solution. In most areas, maximum production is being reached, but the demand is growing because there are more people, but also because people are also getting richer. With some anticipation, the negative effects of the high demand for a limited resource can be mitigated, but as indicated above, in good governance system, high demand is an asset. However, with imperfect fishery management, trade liberalisation has negative effects on fishery sustainability. The Ad Hoc Expert Advisory Panel for Assessment of Proposals to CITES provides a mechanism to reduce the effect of high demand on endangered species.

2.5 Poverty and lack of alternatives

High growth rates in population size in the region as well as migration to the coastal area mean that fishing pressure is increasing with negative consequences on the bio-ecological and economic components of sustainability. New entrants are often poor, they fish for subsistence and their catch may be their unique sources of protein. It is therefore difficult to exclude them from the fishery.

Globalization has the potential to further marginalize small-scale fishermen if they are required to meet certification standards that are outside of their reach. Aquaculture could provide an alternative or complementary source of income for small-scale fishermen. However, complexity and lack of knowledge of the natural, social and economic systems could lead to unsustainability under one or more components of sustainability, e.g. if small-scale fishermen enter into a debt cycle to start aquaculture facilities, or if aquaculture facilities lead to the destruction of habitat that would negatively affect the resources exploited by small-scale fishermen.

As indicated above, the potential contribution of the fishing sector to the national economy is substantial if the fisheries were well managed under the four components of sustainability. The rent generated by the fishery, if recovered by governments, could be used to reduce poverty and create alternative/complementary sources of income.

Possible paths to solution cannot be found in the fishery sector alone and interdepartmental and interagency cooperation is required. Capacity building is also required to help communities organize

and train in decision-making so that they can take full advantage of community-based management. Finding or creating complementary sources of income in a diversified livelihood approach will help but it will need training to take advantage of those complementary or alternative sources of income.

The workshop noted that sometimes, people are moving to the shore and in the fishery because it is a preferable alternative to what they are doing now.

2.6 Complexity and lack of knowledge

The workshop noted that complexity and lack of knowledge does not apply only to the bioecological component of the fishery system. The dynamics of investments and the social dynamics have been considerably less researched and consequently even less is known about them than about the population dynamics of the resource. The workshop believed, however, that lack of knowledge on stock structure in the region could be a reason for insufficient cooperation on shared stocks.

With respect to the bioecological component of the fishery system, the workshop noted that there is considerable knowledge and information available, but that it may not be adequately interpreted, cross-linked, nor are the connections with policy development and fishery management planning appropriate. The lack of appropriately interpreted and cross-linked information is considered an impediment to convincing decision-makers that improvements are necessary.

Similar to the potential negative effects of promoting aquaculture as an alternate/complementary source of income to reduce poverty and lack of alternative, complexity and lack of knowledge makes it difficult to predict the effect of an apparently sensible measure like reducing post-harvest losses. Reducing such losses could result in increased market demand which would put additional pressure to fish harder.

Possible paths to solution to improve on the four components of sustainability, requires that information and research on them is available. This requires multidisciplinary teams addressing the issues. There is a need to promote multidisciplinarity in research through recruitment of a diversity of disciplines to form generalists rather than specialist. Capacity building of all interested parties into co-management and community-based management is also needed to make better use of existing information and knowledge.

The effects of complexity and lack of knowledge of the bioecological component of the system can be reduced. Using existing knowledge and information, appropriately cross-linked, and summarized for decision-making, within participatory and transparent systems, would be one way of reducing the effects of complexity and lack of knowledge as a factor of unsustainability. Very little organized information on the social and economic components of the fishery system is available however.

Under good governance system where the four components of sustainability are pursued, and with appropriate training and capacity building of all interested parties, including fishery scientists and managers, the importance of complexity and lack of knowledge as a factor of unsustainability would be considerably reduced. In systems where interested parties, including decision-makers, are fully involved in all the steps of a transparent fishery management process, they can internalize the uncertainties caused by complexity and lack of knowledge and make the appropriate decisions.

2.7 Interaction of the fishery sector with other sectors and the environment

Pollution, habitat destruction and degradation, coral destruction negatively affect the productivity of the environment and affect negatively the fishery sector. There is increased competition with other sectors (tourism, housing, aquaculture, oil and gas exploration and exploitation, transport, etc.) for usage of the marine environment and the low profile of the fishery sector means that it may loose when confronted with industries that have a higher and more favourable profile.

Interactions with other sectors can also have a positive effect because solutions to the fisheries problem may lie outside the fishery sector through alternative/complementary sources of income, e.g. from ecotourism.

Possible paths to solution include increased and sustained coordination between relevant agencies and the institution of legal requirements to consult the fishery sector on developments that will have an impact on the fishery. Integrated coastal area management is one mechanism through which interagency cooperation can be increased.

More policy research and the promotion of policy dialogue would be useful to better integrate the fishery sector in the rest of the political scene.

3. INTERNATIONAL INSTRUMENTS

The session started with a general presentation on the most important and relevant international instruments: the United Nations Law of the Sea, the United Nations Fish Stock Agreement, the Compliance Agreement, the International Plans of Action (IPOAs) on fishing capacity, on illegal, unreported and unregulated fishing (IUU), on sharks, on seabirds, the Code of Conduct for Responsible Fisheries and the World Summit on Sustainable Development (WSSD).

The discussion was structured around monitoring, control and surveillance (MCS) and compliance, the management of fishing capacity, regional cooperation, conservation, including the Code of Conduct for Responsible Fisheries and Management Plan of Actions (MPAs), and the influence of the region on the international scene.

Participants had a good knowledge of the instruments that were available, a good understanding of the need to implement them and significant efforts have been made to implement relevant ones. Yet, there remain substantial difficulties in tackling open access and monitoring, control and surveillance (MCS) could be improved markedly if less expensive means of monitoring, control and surveillance were developed and implemented. Reducing the effects of poverty and lack of alternatives as a factor of unsustainability will require working hard in coastal areas to tackle the problem of overcapacity in these fisheries. Complexity and lack of knowledge on how to reduce capacity means that it will not be a simple task.

The discussion of each sub-theme is summarized below.

3.1 MCS and compliance

Few of the countries of the Region have ratified international instruments related to the high seas mostly because they are not involved in high seas fishing, but lengthy legal and administrative processes have delayed ratification by those countries that want to ratify the instruments. Most countries have either joined, or are in the process of joining one or more regional fisheries management organizations (RFMOs), particularly for tunas and the Western Central Pacific Fisheries Commission. All countries have laws that regulate the fisheries sector, they are all trying to implement MCS, but conventional approaches are very costly. New, less costly approaches for MCS need to be developed and implemented. Several countries have completed or are in the process of preparing National Plans of Actions on Illegal, Unreported and Unregulated Fishing.

3.2 Management of fishing capacity

The workshop noted that it is difficult to control capacity in the small-scale sector. The least that can be done is to NOT encourage growth in that sector. Capacity building and organization of the communities should help them recognize the negative effects of overcapacity on the bioecological and economic components of sustainability.

For the commercial sector, regular systematic censuses are needed to better estimate the number of boats that are fishing as a first step towards regulating entry. In some countries, the actual number of boats fishing is not well known. All countries have some form of licensing system for commercial boats. Licensing can take several forms: licence can be issued for boats, for boats with some characteristics (length, width, tonnage, horsepower, etc.), they can be issued to individuals, they can be issued for specific fisheries or for fishing specific groups of species, etc. Licences can be permanent, they can be renewed every year or every number of years. Licences can be allowed to be sold or not. The specific system chosen has an influence on how licensing can be used to manage fishing capacity.

Information on both the bioecological component and the economic component of the fishery system can be used to make decisions on fishing capacity. Decreasing overexploitation is generally one of the main objectives of decreasing capacity, but increasing economic viability is an equally valid reason to decrease fishing capacity. If fishing capacity needs to be reduced because the resources are overexploited, having a consensus of all interested parties, including fishermen or their representative, that it is the case is particularly important for the successful reduction of fishing capacity. If fishermen are part of the consensus, it is easier to get agreement on what needs to be done about fishing capacity.

If action is needed on fishing capacity, the first step is a moratorium on the issuance of new licences, i.e. freezing the number of licences. Effective monitoring, control and surveillance is absolutely essential for effective management of fishing capacity. In some cases, attrition has been considered as one possibility to reduce fishing capacity. However, technological improvements are likely to more than compensate for any decrease in fishing capacity that could occur through attrition. Closing the fishery for some period of time is another way to manage capacity, it negatively affects the economic component of sustainability, but it is often considered easier to do than to reduce fishing capacity. Failure to reduce fishing capacity combined with steady technological improvements can reach the point where fisheries would in fact be closed for most of the year, and would be open only for very short periods. Financial incentives to exit from the fishery such as taxes or reducing subsidies can be used to increase the attrition rate, but those are rarely popular with decision-makers. Buyback of fishing licences, boats and fishing equipment is another way to reduce capacity. Traditionally, buyback programmes have been funded by governments, but they can also be financed by industry because the economic viability of those remaining in the fishery will increase. Fishermen can be expected to agree to fund buyback programmes if they hold secure rights to the fishery. If the rights are not considered secure, fishermen are unlikely to agree to finance a buyback programme. For buy-back programmes to be effective, those that have bought should not be able to return to the fishery. The only real solution to technological creep is the attribution of pure fishing rights. This is not easy to achieve but appears to have been achieved in some good individual transferable quota (ITQ) systems.

The region seems to be addressing the problem of fishing capacity in a systematic manner, but there remain problems, particularly with monitoring, control and surveillance.

3.3 Regional cooperation

Regional cooperation occurs through Southeast Asian Fisheries Development Centre (SEAFDEC) for technical issues and in the ASEAN Fisheries Working Group, but there is no regional fisheries management organization (RFMO) in the area. Eventually, countries may see the need to one. At that time, SEAFDEC could evolve to become a RFMO or a new one could be created. Such a body could reconcile fishery management and conservation.

3.4 Conservation

There are a number of initiatives in every country to protect biodiversity, habitat and endangered species. Some measures relate to resource enhancement while others aim at protecting specific species (e.g. sharks, seahorses, turtles). Marine protected areas (MPA) have several names (MPA, marine parks, fishery prohibited zones, fishery closures) and they can take several forms (no fishing allowed,

some fishing by some gear allowed some time, etc.). The diversity of name used can create confusion and it could be useful to agree regionally on a common nomenclature. Trawling bans in coastal area is another common tool used in the region, as is the zoning of fishing activity by vessel or gear types.

The agency responsible for fishery management is not always the one that is responsible for the creation and management of marine protected areas under whatever name they may be identified and in some case the fishery management agency may not even be involved in the creation and management of MPAs. This can create confusion, and could seriously undermine the effectiveness of both fishery management and conservation of biodiversity. It would be logical to consider the management of the fishery and the conservation of biodiversity together, or at least to have very strong coordination between responsible agencies.

The idea of protecting a certain percentage of the aquatic system to conserve biodiversity is being adopted by some countries in the region.

3.5 Influence of the region on the international scene

Currently, there is minimal coordination among countries of the region to adopt common positions at international meetings. This is not because there are disagreements on the issues, but simply because countries do not take the time to discuss their points of view before the international meetings. The workshop recommended such coordination should take place and that representatives of the fishery sector be involved in global meetings dealing with issues that affect fisheries.

4. CONCLUSIONS AND RECOMMENDATIONS

In the context of the project (GCP/INT/788/JPN) factors of overexploitation and unsustainability in fisheries were reviewed extensively and a methodological approach was developed. The regional workshop held in Bangkok, Thailand, from 13 to 16 November 2006 reviewed the result of this project and applied the "approach" developed to the fisheries of the ASEAN Region and their management.

1. The workshop concluded that the types of factors of unsustainability identified in the first three workshops were globally relevant, although their importance can differ from region to region and the interactions between them may be case specific. Generally in Southeast Asia, open access is a sufficiently widespread and serious problem to be considered on its own a factor of overexploitation and unsustainability.
2. The workshop noted that the success of the project (GCP/INT/788/JPN) in addressing policy issues affecting overexploitation and unsustainability was due to the involvement of participants from all main disciplines relevant to fishery management: biology, economics and social scientists.
3. The workshop recognized the need to give a balanced importance to the four components of sustainability (bioecological, economic, social, institutional) taking into consideration clearly identified objectives.
4. The approach used by the project makes it possible to identify the causes of unsustainability, not only the effects, and to propose paths to solution.
5. The workshop recognized that the approach taken by the project is relevant and that it would be interesting to pursue this type of thinking and analysis. The workshop recommended that guidelines be produced in relation to policy and institutional analysis for fishery management. It also recommended that the approach taken by project GCP/INT/788/JPN be applied in the region with the assistance of SEAFDEC and FAO.
6. The countries participating in the workshop are in a transition phase from developing the fishery sector to one where fisheries have to be managed for sustainability. Governance models and techniques for efficient system of management/conservation are not available to the extent required.
7. The workshop concluded that policies, institutions and legal instruments need to be analysed and adapted to the new requirements.

8. Community-based and co-management appropriately embedded in a multilevel decision-making process are seen as essential elements of the governance of the fishery sector.
9. Given the importance of the small scale fishery sector in the region, community-based and co-management are obvious requirements, but implementation is not going to be a simple task. The linkages between arrangements at various geographical scales and amongst fisheries may be particularly difficult and need to be addressed.
10. The workshop recommended that pilot projects on community-based and co-management should be evaluated to provide guidelines for implementation. Once guidelines have been produced community-based and co-management should be implemented systematically where appropriate. Pilot projects may still be needed where there is little experience with community-based and co-management.
11. Capacity building in fishery management of all interested parties is needed especially with regards to community-based, co-management and licensing.
12. The workshop was pleased to note that all countries are making good progress on the implementation of international instruments that are relevant to them.
13. Efforts to fully implement the FAO Code of Conduct for Responsible Fisheries, its ASEAN-SEAFDEC Guidelines for implementation, and the FAO international plans of actions, particularly those on management of fishing capacity, on illegal, unreported and unregulated (IUU) fishing, and on the management of shark fisheries should be continued and strengthened.
14. The workshop recommended that new, less costly, and more effective monitoring, control and surveillance systems be developed and implemented.
15. The workshop noted that currently there is no regional fisheries management organization (RFMO) in this region. In due time, it would be desirable to either create a new regional fisheries management organization or to have an existing regional organization evolve to become a RFMO.
16. The fishery system is intrinsically complex under the four components of sustainability. The perception of complexity is linked to lack of knowledge, particularly on the social and institutional components. It is important to improve knowledge on these components and also to promote the exchange of information in a way that is understandable by all parties concerned.
17. Complexity and lack of knowledge should not be an excuse for not making decision and implementing necessary management measures.
18. The workshop recommended the introduction of secure rights and other incentive systems (e.g. economic and financial) to foster responsible industry behaviour and tackle the issues of overexploitation and overcapacity.
19. The workshop recommended that the profile of the fishery sector be raised nationally and internationally. In this context, representatives of national fishery management processes should be involved in meetings dealing with global issues affecting the fishery sector.
20. The workshop noted that there is a need to coordinate among the countries to advance the interest of the region in international fora.

ANNEX 1

Agenda

(Bangkok, Thailand, 13–16 November 2006)

Monday 13 November (plenary) – 08.30 –17.30

General presentation of the project "factors of unsustainability and overexploitation"

Presentation and discussion on main conclusions and recommendations of the project

Presentation and discussion on the approach and methods followed by the project

Tuesday 14 November (2 groups) – 08.30–17.30

Identification and discussion of main factors of unsustainability in the region

Identification and discussion of paths to solution for the region

Wednesday 15 November (2 groups) – 08.30–17.30

Identification and discussion on difficulties and obstacles for States and regional fishery bodies of the region to implement existing fisheries instruments

Discussion on way these difficulties and obstacles can be overcome

Thursday 16 November (plenary) – 08.30-17.30

Drafting and adoption of conclusion and recommendations

ANNEX 2

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PART 3

REGIONAL WORKSHOP FOR CARICOM MEMBER COUNTRIES ON FACTORS OF UNSUSTAINABILITY AND OVEREXPLOITATION IN MARINE FISHERIES

Bridgetown, Barbados, 6–8 December 2006

1. INTRODUCTION

The third regional workshop organized within the framework of the FAO project GCP/INT/788/JPN was held in Bridgetown, Barbados, 6–8 December 2006. The workshop was attended by 26 experts, in their personal capacity, representing a wide range of disciplines and experience.

Section 2 summarizes the discussion on the regional factors of unsustainability and possible paths to solution and Section 3 summarizes the discussion on international instruments. Section 4 presents the conclusion and recommendations of the workshop.

The workshop agenda and the list of participants are provided in Annex 1 and Annex 2, respectively.

2. FACTORS OF UNSUSTAINABILITY AND POSSIBLE PATHS TO SOLUTION

2.1 Lack of good governance

The workshop agreed that the lack of good governance[1] was at the heart of the poor success of fisheries management. The lack of good governance has several causes including the lack of political will to make difficult decisions, political interference inconsistent with policies, conflicting objectives of different agencies, overlapping mandates and lack of coordination. Insufficient and ineffective monitoring, control and surveillance also contributes importantly to the lack of good governance. Poor enforcement allows destructive aquaculture and fishing practices to take place. The workshop noted that community involvement can be helpful in improving monitoring, control and surveillance.

Most countries in the region have reasonably up-to-date fisheries law and regulations, but implementation is less than perfect because of insufficient monitoring, control and surveillance, lack of appropriate incentives and lack of appropriate institutional framework. There are no mechanisms to empower fishermen to protect the resources they exploit and which, they should realize, is theirs to protect. Environmental non-governmental organizations play an important advocacy role to promote the protection of the environment and the sustainable utilization of renewable resources, but in the end, either the political will to implement difficult decisions is lacking, or the means to implement difficult decisions have not been identified.

Governance in the fisheries sector is linked to governance of the countries. Generally speaking, and this does not apply only to the Caribbean, there is room for improvement in both. Countries in the region are relatively small and constituents generally have comparatively easy access to the Ministers, who, if they want to get re-elected, need to be responsive to the needs of their constituents, which sometimes may be conflicting with policy decisions and good fisheries management practices. Community-based and co-management, when interested parties are properly trained to become

[1] Good governance processes are open, participative, inclusive, accountable, effective and equitable.

effective participants, and if carefully and gradually implemented, is probably one of the best path to improving fisheries management in the region.

In the Caribbean, markets have not yet begun to play the positive role they can play in improving fisheries management through, e.g. ecolabelling. In fact, they sometimes play the opposite role because demand is high for only a few species, which leads to their overexploitation and to wastage of other species through discarding.

Some participants considered that insufficient knowledge on the status of the resources in their fisheries or in for fisheries in their EEZs was an important factor of unsustainability. Others noted that uncertainties in stocks assessment are large, and are likely to remain large. Fisheries management systems should be robust to the uncertainties in the estimates of the size of the resource.

There is not a common and shared understanding of what good governance means, and each participant has its own understanding. Governance is the steering mechanism that society gives itself to ensure its own persistence and survival. Good governance needs legitimacy and trust among the multiple players, accountability and purpose based on shared values. Building trust in the governance system is probably one of the main challenges in any constituency. What is good governance or one aspect of good governance in one country is not necessarily good elsewhere in a different context. In most cases, good governance is likely to involve a complex, networked and nested adaptive systems tailored to specific sociocultural characteristics. Good governance also takes into account the belief system: in an environment where interested parties, including those responsible for monitoring, control and surveillance, believe that nature (e.g. hurricanes) are the main driving force of fishery production, there is little point in stopping someone from fishing illegally.

However, in general, within a governance system that abides by key principles of good governance such as transparency, participation and legitimacy, management of fisheries resources is likely to be more sustainable.

The potential contribution of the fishery sector to the national economies of Caribbean countries is substantial if the fisheries were well managed under the four components of sustainability. Well managed fisheries in good governance systems would generate rent that governments could recover and share equitably within society.

2.2 Inappropriate incentives

Currently, many fisheries operate in response to incentives (economic and others) that promote unsustainable practices rather than sustainable ones: rules and regulations are poorly enforced and illegal activities are perceived to bring rewards rather than penalties. Inappropriate incentives apply throughout the fisheries management process to industry, to governments and to institutions. In the Caribbean, fisheries management is affected not only by inappropriate incentives in the fisheries sector, but also in other sectors, including tourism and land development.

In the fisheries sector, policy still seems to aim at development even though most of the near shore areas are considered overexploited. Incentives aimed at development further from shore often have negative impacts on the already overexploited near shore resources. Currently, financial incentives are not geared towards decreasing overexploitation and protecting the marine environment and biodiversity. Governments want to help small-scale operator earning a better living, but because this is not done in an integrated approach taking into account the likely repercussions, the outcome is far from the desired one. In other words, the incentives are inappropriate because the whole range of likely effects is not considered, only the most immediate one is. As a result, there are unintended consequences of the decisions. When changes to regulations, measures, incentives or instruments are considered clear the consequences on other components of the system or other communities should be explicitly and clearly taken into account.

2.3 Poverty and lack of alternatives

The Caribbean suffers from the same problems as Africa and Southeast Asia: the fishery is seen as an employer of last resort, and many people in the fishery do not earn sufficient money from it to make a decent living. Although their income fishing may not be high, the fishery may contribute to their food security. Also similar to observations made in the previous two regional workshops, some fishermen do make good earnings from the fishery, but they do not always spend it wisely. Capacity building and training in making better use of the money earned from fishing would be helpful to decrease poverty. Also similar to the other two previous regional workshops, some small to medium size operators are highly profitable and their conduct their operations in business like manner. The sectors (e.g. pelagic in Saint Kitts) attract more operators which, in due time, will decrease the profitability of existing participants unless access is restricted.

Possible paths to solution cannot be found in the fishery sector alone and inter-departmental and interagency cooperation is required. Capacity building is also required to help communities organize and train in decision making so that they can take full advantage of community-based management. Finding or creating complementary sources of income in a diversified livelihood approach will help but it will need training to take advantage of those complementary or alternative sources of income.

The workshop noted that sometimes, people are moving to the shore and in the fishery because it is a preferable alternative to what they are doing now.

2.4 Complexity and lack of knowledge

Complexity and lack of knowledge does not apply only to the bioecological component of the fishery system. In fact, there is probably more known about the fishery resources in the Caribbean than about the fishing sector, the dynamics of investments and the social dynamics. In this context, improved knowledge of the social, economic and cultural importance of the fishery to the nation would be useful to ensure that the fishery sector is adequately treated in the national planning process.

Participants agreed that the traditional ways of acquiring knowledge in large-scale commercial fisheries of the north Atlantic, where fishery independent surveys are conducted at least every year, and sometimes more than once every year, combined with extensive sampling of the landings in ports or of the catch at sea, is unlikely to be feasible in the relatively small-scale fisheries of the Caribbean. There is, however, considerable knowledge and information available, but that it may not be adequately interpreted, cross-linked, nor are the connections with policy development and fishery management planning appropriate. The lack of appropriately interpreted and cross-linked information is considered an impediment to convincing decision-makers that improvements are necessary and possible. There is a need to look at innovative ways of extracting, harnessing and using existing knowledge from fishermen and scientists, not only from those currently active, but also from older ones in order to put current stock status in perspective with previous ones. The workshop noted that such information needs to be collected and validated using appropriate methodologies of the social sciences.

The Caribbean Large Marine Ecosystem (CLME) is being developed because heads of States agreed that while available information and knowledge may not be perfect, there is a considerable amount of knowledge on the living marine resource but there was a lack of mechanism to use that knowledge in decision-making. Therefore, the focus of the CLME, while not minimizing the importance of acquiring new scientific, social or indigenous knowledge, has chosen to develop a governance framework to would enhance utilization of existing knowledge, and not necessarily require acquiring extensive new knowledge. There is a general sense that there is enough information to advance the goal of utilizing the resources in a more sustainable manner and to improve fisheries management. Raison d'être is to put in place the mechanism and institutions to make decisions, but those decisions would be implemented by the countries.

2.5 Interaction of the fishery sector with other sectors and the environment

As in other areas, pollution, habitat destruction and degradation, coral destruction negatively affect the productivity of the Caribbean environment and reduces fishery production. There is increased competition with other sectors (tourism, housing, aquaculture, oil and gas exploration and exploitation, transport, etc.) for usage of the marine environment and the low profile of the fishery sector means that it may loose when confronted with industries that have a higher and more favourable profile. Government organization in the Caribbean appears to have changed little over the last 100 years, and it may no longer be appropriate for the challenges of today. Government structures better suited to the complex, multidimensional and multi sectoral development issues of the twenty-first century may need a re-thinking of the relationships between various government organizations. In particular, conservation of bio-diversity and fisheries management should not be seen as competing activities and should be reconciled.

Properly implemented Coastal Zone Management provides a model for a coordinating mechanism to put all interested parties and decision-makers around the same table.

Interactions with other sectors can also have a positive effect because solutions to the fisheries problem may lie outside the fishery sector through alternative/complementary sources of income, e.g. from ecotourism.

2.6 Summary

This regional workshop for the Caribbean focused more on governance than the two previous regional workshops. The suggestion to use advocacy groups as an instrument towards reducing overexploitation and unsustainability is new. Different sorts of inappropriate incentives were discussed, but it is clear that open access is a major factor of overexploitation and unsustainability because it provides inappropriate incentives to fishermen to get into profitable but already overexploited fisheries where the bioecological and economic components of sustainability are already at risk. High demand for a limited resource, selective export markets, and limited means to fully implement effective fisheries management have to be taken into account when looking for paths to solution. Complexity and lack of knowledge is not seen as an insurmountable obstacle if mechanisms are put in place to validate and use existing knowledge in the full understanding that complexity and lack of knowledge is not be a reason for lack of action. Fisheries management authorities need to act with precaution, taking into account that systems are complex and that an adaptive approach, probing the system and adapting the management response, could be the best and most cost effective way towards sustainability.

3. INTERNATIONAL INSTRUMENTS

The most important and relevant international instruments for fisheries management are: the UN Law of the Sea, the UN Fish Stock Agreement, the Compliance Agreement, the International Plans of Action (IPOAs) on fishing capacity, on illegal, unreported and unregulated fishing (IUU), on sharks, on seabirds, the Code of Conduct for Responsible Fisheries and the World Summit on Sustainable Development (WSSD).

The discussion was structured around four main heading: inappropriate incentives and access control, IUU fishing, MPAs, and regional perspective.

Relevant international instruments all state that controlling access to the fishery sector is a *sine qua non* condition for the management of fishing capacity. Mastering the growth of fishing and processing capacity, either directly or indirectly, through licensing, rights allocation, financial incentives, taxes, etc. is a necessary condition if unsustainability is to be avoided.

3.1 Inappropriate incentives and open access

All the countries with participants in the workshop either had or were in the process of acquiring legal and administrative means to control and manage capacity, but limits have yet to be set. In most countries, but not necessarily in all fisheries of all countries, someone who wants to enter the fishery sector can still do so even though near shore resources are considered to be overexploited.

Countries need to develop a common vision of what limiting access is about, and what are the rights and obligations of interested parties, including government, non-government institutions, and the fishing industry. Many countries still to be in a *de facto* open access situation. Countries will eventually need to reduce capacity as well as the actual fishing effort exerted in some fisheries. Planning should occur soon before the situation deteriorates further. Regulating, monitoring and controlling access, as well as the effort expanded, require monitoring, control and surveillance programmes. More sophisticated management systems normally require more MCS, but the better the cooperation with interested parties, particularly with fishermen, the easier it is to tackle the problems.

The paths to solution therefore imply a common and shared vision on access control, enabling legislation, plans and policies to access control, active participation of interested parties, extensive training of interested parties on rights and obligations, a review of financial incentives, tax system, subsidies, concession, etc. Industry should contribute to the costs of management because industry is going to be major beneficiary of improved fisheries management.

Implementation will not be easy and it will require regional cooperation, among other things to improve MCS and compliance.

Compared with the other regional workshops, fisheries management in the Caribbean is progressing in similar direction but at a slower pace, and a greater reliance on technical measures. In Southeast Asia, there was more emphasis on controlling access in all the fleets.

3.2 Illegal, unregulated and unreported (IUU) fishing

IUU fishing is linked with monitoring, control and surveillance, but also with the United Nations Fish Stock Agreement and the FAO Compliance Agreement.

Although numerous initiatives to tackle IUU fishing have been taken by Caribbean countries in recent years, it continues to be a problem because of the difficulties of monitoring, control and surveillance. This is a serious problem because there is no point in having good rules and regulations if there are no mechanisms to ensure that rules and regulations are obeyed and complied with. Few countries in the Caribbean had National Plans of Action to control IUU, but a number of countries have taken steps to address flags of convenience and transhipment.

Participants noted that enforcement interferes with co-management, and those who do the MCS should be someone else than those that are trying to manage the fisheries in cooperation with the fishermen. Participants suggested that FAO could develop a Technical Cooperation Programme to identify concrete steps that could be taken to improve both co-management and MCS. In most countries, compliance will probably have to involve a large component of self-enforcement because there is not enough resource in national fisheries department. The industry is willing to participate; in Suriname, the industry paid for fuel for the coast guard so they could go on patrol. Mechanism to enlist fishermen in self-enforcement and surveillance need to be found. These are likely to involve some kind of rights based access to fishing when being vigilant rewards right owners. The real root issue that needs to be addressed it the involvement of the users of the resource in co-management and integrated management framework. The notion of promoting compliance, including public education could bring considerable benefits.

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3.3 Marine protected areas (MPAs)

There are a number of initiatives in every country in the Caribbean to protect biodiversity, habitat and endangered species. Some measures relate to resource enhancement while others aim at protecting specific species (e.g. sharks, seahorses, turtles).

Clearly, fisheries management is not a simple undertaking and it faces many difficulties. Marine protected areas are sometimes seen as a conservation tool, but they can also be used as a fisheries management tool. From the discussions in the workshop, it seems that, in the Caribbean, conservation initiatives do get more support than fisheries management one. The implementation of MPAs is driven by institutions that have not traditionally been used in fisheries management. They are good at advocacy, raising the profile of the issues that are important to them, obtaining support for their resolution and providing training to people that will be involved. Often, these are NGOs with funds and resources.

MPAs have become popular tools for both conservation and fisheries management and generally speaking, there seems to be more support world wide for conservation initiatives than for fisheries management ones. This may be related to the perceived lack of success of conventional fisheries management, but it is too early to assess if conservation has been more successful. Four of the main factors of unsustainability could be addressed by MPAs: inappropriate incentives, high demand for limited resource, complexity and lack of knowledge and lack of good governance.

The perceived failure of fishery management is relative and depends on the nature of resource. Fishery management may not have failed where pressures have not yet been high. When fishing pressure is low and when there overcapacity has not yet been reached, conventional fishery management may appear to be sufficient to manage fisheries. Unless measures are taken, however, fleets will expand, overcapacity will materialize, and problems will become difficult to handle. Steps must be taken before the problems materialize.

3.4 Regional perspective

Countries of the Caribbean recognize the need to cooperate and coordinate to protect and shared living marine resource and have sustainable fisheries exploiting them regionally and internationally. Coordination and cooperation in fisheries in the Caribbean occurs mostly through two organization, the Caribbean Regional Fishery Mechanism (CRFM) (http://www.caricom-fisheries.com/index.asp) and the Western Central Atlantic Fisheries Commission (WECAFC) (http://www.fao.org/fi/body/rfb/WECAFC/wecafc_home.htm). At the time of the meeting, a Caribbean Large Marine Ecosystem was being developed, but not yet functioning. Fisheries management in the Caribbean is guided by the principles of the FAO Code of Conduct for Sustainable Fisheries. During the workshop, discussions the development of a Common Fishery Policy and Regime for the Caribbean were very lively.

Although everyone recognized the need for cooperation and coordination, support for a Common Fishery Policy and Regime and the establishment of a common fishery zone varied depending on national conditions (surplus of fish versus deficit, size of vessels and fleets, MCS capabilities, etc.).

Regional cooperation seems similar to what was reported in the two previous regional workshops. Regional mechanisms are trying to help in a range of areas, including MCS, planning and policy making, capacity development, public support, promotion of fishers organization, conflict resolution, information system, etc.

3.5 Methodological approach

The methodological approach taken by the project CCP/INT/788/JPN has similarities with existing methods aimed at conducting similar assessments or analysing similar issues based on expertise such

as the Delphi and nominal group techniques. The unsustainability approach emerged as the project evolved, it was not designed before undertaking the project. The methodological approach should be formalized and guidelines on how to best apply it to diagnose and improve fisheries management systems could be developed.

Participants in the workshop suggested that it would be useful to apply the methodology in individual countries. This would not involve doing stock assessments because doing more work on stock assessment will not resolve the problem. The objective would be to identify solutions that will resolve the problem at reasonable costs.

Considerable progress could be made by doing a systematic review of governance nationally and regionally. Instruments, human and financial resources are available to do fisheries management but the governance frameworks do not seem to lead to lasting successes. Investigating why fisheries management is less successful than expected, and why despite all the efforts invested in fisheries management resources continue to be overexploited could provide a different point of view on why sustainability is not achieved.

4. CONCLUSIONS AND RECOMMENDATIONS

In the context of the project (GCP/INT/788/JPN) factors of overexploitation and unsustainability in fisheries were reviewed extensively and a methodological approach was developed through three international workshops. The regional workshop held in Bridgetown, Barbados, from 6 to 8 December 2006 reviewed the result of the previous international workshops and applied the "approach" developed to the fisheries of the CARICOM region and their management.

1. The workshop concluded that the types of factors of unsustainability identified in the first three international workshops (lack of good governance, inappropriate incentives, high demand for limited resources, poverty and lack of alternatives, complexity and lack of knowledge, interaction of the fishery sector with other sectors and the environment) were highly relevant. The lack of good governance was identified as a major factor at the centre of overexploitation and unsustainability.

2. The workshop noted that the success of the project (GCP/INT/788/JPN) in identifying policy issues affecting overexploitation and unsustainability was due to the involvement of participants from all main disciplines relevant to fishery management: biology, economics and social scientists.

3. The workshop recognized the need to give a balanced importance to the four components of sustainability (bioecological, economic, social, institutional) taking into consideration clearly identified objectives.

4. The workshop noted that the approach used by the project makes it possible to identify the causes of unsustainability, not only the effects, and to propose paths to solution.

5. The workshop recognized that the approach taken by the project is relevant and that it would be interesting to pursue this type of thinking and analysis at the regional and national levels in the region.

6. The workshop recommended that FAO develops a regional Technical Cooperation Programme (TCP project) with the aim to identify concrete steps to rectify factors of unsustainability and improve fishery management and advise on how to best allocate the limited human, material and financial resources at the national and regional levels.

7. Some near shore areas in most of the countries participating in the workshop are considered fully to overexploited but development possibilities are still available further offshore for pelagic and demersal species.

8. The workshop recognized that near shore fisheries were being negatively impacted on by anthropogenic influences other than fishing.

9. Concerning governance, the workshop recommended systematic awareness building on the need for fisheries management as well as the advantage that could be derived from promoting studies and analysis of fisheries – related governance issues. The workshop noted that governance models and techniques for efficient system of management / conservation are being developed in the context of the Caribbean Large Marine Ecosystem (CLME) project.

10. A related issue for the region is the high demand for all marine – based resources (fisheries, tourism development, recreation activities, transportation, extractive activities). An integrated approach to fishery management was recommended in connection with integrated coastal zone management for near shore fisheries and in the context an overall ocean governance for offshore fisheries.

11. The workshop also emphasized the need for fishery management policies and plans duly developed and implemented at the national and regional levels integrated in national development programmes.

12. The workshop also expressed the need to take steps to build up political support for fishery management and conservation and the need for governments and stakeholders to buy–into fishery management and conservation.

13. The workshop noted that the availability of development possibilities for offshore pelagic and demersal species opened management possibilities for the region that are generally not available in other parts of the world.

14. The workshop concluded that current de facto open – access of fisheries in the region could eventually lead to unsustainability. The workshop noted and supported efforts being presently undertaken in the region to progressively regulate/close access and manage fisheries in the context of community – based co-management approaches and limited entry schemes.

15. The workshop noted that community-based and co-management appropriately embedded in a multi-level decision-making process based on the subsidiarity principle are essential elements of the governance of the fishery sector.

16. The workshop recommended that policies, institutions and legal instruments be reviewed, updated, strengthened and implemented.

17. The workshop noted that capacity building in fishery management of all interested parties, including decision makers, is needed.

18. The workshop recommended that the relevance of the fishing industry to economic and social development be promoted and reinforced both nationally and regionally.

19. The workshop noted that considerable conservation efforts have been made in the region (e.g. turtles, conch, etc.).

20. MPAs were discussed at length by the workshop in relation to both environmental protection and fishery management. The workshop noted that although the potential

beneficial impacts of MPAs remain to be fully confirmed, the approach enjoys considerable support in the region. It was mentioned that, if efficient, MPA do answer many of the key factors of unsustainability and overexploitation. It was also noted that MPAs often provided an institutional framework to address fishery management at localized levels.

21. The workshop noted that the region had so far generally avoided the catastrophic fishery management failures observed in other areas of the world.

22. The workshop noted that little progress has been made on the implementation of international plans of action through the development of national plans of action.

23. The workshop recommended that efforts to fully implement the FAO Code of Conduct for Responsible Fisheries and the FAO international plans of actions, particularly those on the management of fishing capacity, on illegal, unreported and unregulated (IUU) fishing, and on the management of shark fisheries be increased.

24. In relation to IUU the workshop noted efforts undertaken in the region to address flag states and port states responsibilities according to international law.

25. The workshop recommended that means to promote and encourage compliance, including advocacy as appropriate, with the help of communities combined with innovative ways of doing monitoring, control, surveillance and enforcement activities are required.

26. The workshop noted that the small sizes of most fisheries departments makes it necessary for the same individuals having multiple tasks, e.g. extension activities combined with management and enforcement activities leading to less effective effort on both fronts.

27. The workshop concluded that complexity and lack of knowledge should not be an excuse for not making decision and implementing necessary management measures following precautionary and adaptive approaches.

28. Although scientific knowledge is far from complete, the workshop concluded that, properly used, existing knowledge of the fisheries allowed the type of management decisions needed in the region.

29. The workshop recommended, in complement to scientific work, that greater emphasis be put on accessing and analysing industry and community knowledge among other things on the status of the resource and of the fishery.

30. The workshop recommended that existing incentives (financial, economic, social and cultural) should be reviewed and evaluated for their consistency with current policy objectives.

31. The workshop noted that the economic component of sustainability of fishing households would be improved by capacity building in the area of small business management. This would also contribute to poverty alleviation.

32. Regional cooperation was discussed in the context of CARICOM/CRFM, WECAFC and other initiatives. The need for strengthened regional cooperation was stressed. Concerning the Common Fisheries Policy and Regime, the workshop expressed the view that the principle of subsidiarity (doing things at the most appropriate level – regional, national, local) should be carefully considered. The workshop also recommended that

increased emphasis be given at the regional level to helping member states in addressing governance and policy review, analysis and reform.

33. Countries should have a careful look at the socio-economic profile of their industry in relation to poverty and adjust their policies accordingly (link with incentives).

ANNEX 1

Agenda

(Barbados, 6–8 December 2006)

Wednesday 6 December – 08.30–17.30

Opening

General presentation of the project "factors of unsustainability and overexploitation"

Presentation and discussion on main conclusions and recommendations of the project

Identification and discussion of main factors of unsustainability in the region

Thursday 7 December – 08.30–17.30 (Group discussion)

Presentation and discussion on the approach and methods followed by the project

Identification and discussion of paths to solution for the region

Friday 8 December– 08.30–12.30 (Group discussion)

Identification and discussion on difficulties and obstacles for States and regional fishery bodies of the region to implement existing fisheries instruments; discussion on way these difficulties and obstacles can be overcome. Emphasize will be given to instruments that relates to illegal, unreported and unregulated (IUU) fishing; access and fishing capacity; as well as marine protected areas (MPAs) as management and conservation instruments.

Friday 8 December– 13.30–16.30

Drafting and adoption of main conclusion and recommendations

Closing

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PART 4: TECHNICAL DOCUMENTS SUBMITTED TO THE WORKSHOPS

APPENDIX A

REVIEW OF FACTORS CONTRIBUTING TO OVEREXPLOITATION AND UNSUSTAINABILITY IN FISHERIES

Summary of findings from FAO Project GCP/INT/788/JPN

by

Jean-Jacques Maguire

1. INTRODUCTION

The objective of FAO Project GCP/INT/788/JPN: *Review of factors contributing to overexploitation and unsustainability in fisheries* is to improve the management and conservation of the world's fisheries. This is not the first nor the only project with these objectives, but it is one of the few to systematically examine the factors that cause unsustainability rather than to try to identify the factors that promote sustainability.

The international community has been productive over the last 10 to 15 years in adopting various international instruments, both voluntary and compulsory, to promote sustainability and prevent the overexploitation of fisheries (the United Nations Fish Stock Agreement, the FAO Code of Conduct for Responsible Fisheries, various international plans of action, the Compliance Agreement, Agenda 21, etc). Yet, overexploitation of fisheries appears to remain considerably more frequent than would be expected from effective fishery management systems, particularly within national EEZ where means to control overexploitation have been available for a much longer time than in international waters.

The project has organized three international workshops where participants, invited in their individual capacity, originated from the traditional fields of fishery biology and fishery economics, but also from the newer fields of fishery sociology and anthropology. The discussions at the first workshop in Bangkok in 2002 were stimulated by two discussion papers distributed before the workshop. The second workshop in Mauritius in 2003 discussed factors of unsustainability on the basis of case studies prepared for four types of "idealized" fisheries: large volume demersal fisheries, large volume small pelagic fisheries, tuna fisheries and artisanal fisheries. The third workshop in Siam Reap, Cambodia, in 2004 worked from discussion papers prepared on the basis of the first two workshops to discuss further the factors identified and consider interactions between the factors.

The three workshops operated under the understanding that sustainability is a multidimensional concept with at least four components: a bioecological component, an economic component, a social[1] component and an institutional component. The workshops also understood that a reasonable balance between the four components should be sought in order to have a fair probability of achieving the component of sustainability would be expected to have lower probability of achieving overall sustainability.

For the preparation of this summary, the main *Conclusions and recommendations* of the three workshops were reviewed, they were used to form the outline of this summary. Papers and comments submitted by participants were also used. The paper draws largely on the discussions, conclusions and

[1] The social component of sustainability can itself have multiple components or interpretations. It can refer to the equitable distribution of the benefits extracted from the resource in the most economically efficient way, or it can relate to the choice of a harvesting technology or other constraints on the harvesting production function which may not be economically optimal but will result in greater employment while still being highly acceptable from an economic perspective and well within the constraints of bioecological sustainability.

material submitted to the three workshops organized by the project. A background section on fishery characteristics is followed by commentaries on governance, rights and capacity building, the ecosystem approach, transition costs, uncertainties and interactions, balance between the components and improving institutions, based, *inter alia* on the papers prepared for the workshop.

The target readership is senior staff of fisheries departments or related research institutions, members of the fishing industry, of non-governmental organizations and the general public. The summary reviews findings related to fisheries management and related research, with emphasis on policy implications.

Several factors of unsustainability have been identified. Some are internal to fisheries, others can be considered external. Some contribute directly to unsustainability, others are symptoms. Factors play different roles at various stages of the fishery management process and under different jurisdictions. Factors contributing to unsustainability are of a similar nature in almost all fishery systems and jurisdictions, if on a different scale and with a variable importance. Six main factors of unsustainability were identified at the first workshop:

1. inappropriate incentives;
2. high demand for limited resources;
3. poverty and lack of alternatives;
4. complexity and lack of knowledge;
5. lack of governance; and
6. interactions of the fishery sector with other sectors and the environment.

These were found to be still valid at the second workshop where six main conclusions were agreed:

1. poor governance is a major cause of unsustainability;
2. the absence of secure rights is one of the causes of poor governance;
3. there is a widespread need for capacity building and knowledge sharing;
4. fishery management systems should aim for a better balance of the four components of sustainability;
5. unsustainability occurs because of a lack of will to make difficult decisions; and
6. there is a need to make better progress on the implementation of international instruments.

The third workshop helped to understand how the various factors of unsustainability interact and what factors need to be taken into account to improve sustainability.

The six conclusions of the second workshop help organize hierarchically the original six factors of unsustainability:

Poor governance is the main factor of unsustainability. The causes of poor governance are inappropriate incentives, complexity and lack of knowledge, poverty and lack of alternatives and the lack of will to make difficult decisions. The will to make tough decisions does not only refer to lowering catches in order to protect the resources, it may also refer to displeasing political friends/present participants in order to have more participants in the fishery or a more equitable distribution of the benefits from the fishery. High demand for a limited resource, one of the original six factors of unsustainability, is a factor of unsustainability only under a poor governance system with inappropriate incentives. Similarly, the interactions of the fishery sector with the other sectors and the interactions with the environment are factors of unsustainability because of poor governance. Under good governance, high demand for limited resources, as well as the interactions with the environment and with other sectors would be taken into account as necessary. In particular, the influence of the environment would be recognized as outside the reach of the management agency and contingency plans would be built in the fishery management system to take them into account.

Poor governance results in a disproportionate overt emphasis on the bioecological component of sustainability, because it is the only one that is considered amenable to neutral, apolitical, scientificand objective analysis. However, the overt objective of promoting the bioecological component of sustainability is often not achieved because of complexity and lack of knowledge, but also because fishery management may covertly pursue the economic or social component of sustainability. As a result, decisions apparently made to protect the resources may not be properly implemented because they imply social and economic pains. As a result of ineffectual implementation of the measures, they do not achieve the intended bioecological objective and resources continue to decline. A severe lack of confidence in the system follows. Good governance systems would overtly pursue all objectives and find means that would give the appropriate compromises between the four components of sustainability.

2. FISHERY CHARACTERISTICS

Ecosystems and Variability

Fisheries take place in complex ecosystems where species are linked to one another through elaborate competitive and predatory relationships that vary along the life history stages of each species. For example, cod eggs and larvae are eaten by herring and mackerel who themselves are prey to adult cod. Cannibalism is not uncommon in some species with obvious implications: large stock sizes of adults of such species will depress incoming recruitment to their own species. Cannibalism is one mechanism by which the so-called Ricker stock and recruitment relationship – where recruitment is maximum at some intermediate spawning stock size and gets smaller as stock size increase – can be produced. It is clear that harvesting one species will affect many others either directly or indirectly with variable magnitude, in the short, medium or long term. In this context, fishery management must be aware of the impacts fishing has on the ecosystem as well as of the impact the ecosystem has on fishery resources. Management actions should therefore aim at protecting the functioning of ecosystems rather than individual species.

Sustainability does not mean constancy nor stability: fish stocks, ecosystems, institutions and societies are inherently dynamic and in sustainable systems, stocks, ecosystems, institutions and societies will continue to change and evolve. The challenge is that human actions do not cause the stocks and the ecosystem to fluctuate outside natural ranges where institutions may be unable to cope and societies will be detrimentally affected sustainability requires that perturbations to fishery ecosystems (including the human dimensions of the ecosystems) be reversible. Ecosystems cannot be "engineered" through management actions into some desirable configuration and then kept there through more management: changes and evolution are unalterable characteristics of ecosystems.

Natural variations in the abundance of fishery resource in the absence of fishing can be due to short term variations in recruitment, or on the longer term, they may be due to regime-shifts during which some species are favoured. Variability is therefore a feature of fisheries that cannot be removed by management, but whose effects management should try to minimize through adaptable management strategies that deals with the inherent risk and uncertainty of future yields. Species are not all similarly vulnerable to overfishing, but, in a precautionary approach, it should be assumed that fishing can cause all species to collapse. One of the greatest challenges to fishery science and management is to identify the causes of changes in abundance and to differentiate between those due to fishing and those due to natural factors.

Resilience

As indicated above, sustainability requires that perturbations to fishery ecosystems (including the human dimensions of the ecosystems) be reversible. Reversibility of a system is linked to its resilience – the ability of a system to absorb and "bounce back" from shocks, whether internal or external. Evaluating resilience is important in fisheries because: (a) it requires a system's approach, i.e. to look at all the components of the fishery system, and (b) it focuses on responding to uncertainty and

perturbation, two features that dominate in fisheries. The vulnerability of species and ecosystems to fishing depends on their resilience.

Resilience and reversibility have different implications for natural and human components of ecosystems. Individual fish stocks may show large natural fluctuations, which may be cyclical or not, due to human intervention or not, without altering the integrity of the ecosystem. Resilient systems will be able to withstand large natural and human interventions and still be able to revert to a previously observed "natural" state. Less resilient system may be detrimentally affected even by minimal natural and or human intervention. As we consider humans to be part of the ecosystem, it is noteworthy that the human components of ecosystem may be less reversible than the natural components: once a fishing community has lost its fishing people and the knowledge of how to fish it may never be able to regain it. Another fishing community of a different nature may emerge somewhere, but the human component of the ecosystem where the lost community used to belong, has been irreversibly changed. It should be recognized, however, that social changes does occur, unrelated to fishery governance.

The resilience of fishery resources to exploitation either directed or when taken as by-catch, varies greatly by species. Even within one species group, such as tunas, the vulnerability varies by species. Tropical tunas typically have a short life span and high reproductive potential, and, with the exception of the big eye tuna the stocks are considered to be resilient to exploitation. Temperate tunas typically have a long life span and reproduce at an advanced age, in well defined breeding areas, and are highly vulnerable to overexploitation as illustrated by the steep decline in blue fin tuna. Temperate tunas are therefore considerably less resilient than tropical tunas. Although, tropical tunas are considered to be highly resilient, and over fishing may not be an immediate threat, continued increases in fishing effort and in fishing efficiency is expected to ultimately lead to over fishing and depletion unless appropriate management is implemented.

3. FISHERY SCIENCE AND MANAGEMENT

Fisheries are generally classified according to various criteria such as the gear used (fixed or mobile, gillnet, line, etc.), the type, size and power of vessel (less than or greater than one or more thresholds), the utilization of the catch (subsistence, commercial or recreational) or to a spatial dimension (inshore, near shore, offshore, inland). Most fisheries, however, are characterized by complexity in one or several of their characteristics. In addition, fisheries, like ecosystems and societies are dynamic. They respond quickly to changes in species composition, market demands, and regulations by management agencies.

A large proportion of fisheries are currently covered by some form of management, yet, there is a perception that fishery management has not been successful. The unsatisfactory performance of traditional fishery management may best be illustrated by large volume demersal fisheries where a relatively small number of species are targeted in a large but delimited area by a comparatively small number of fishing units. Many of these fisheries have operated under structured fishery management, based on peer reviewed scientific advice, for several decades. Nonetheless, failures of fisheries management in such fisheries have been common as illustrated by the collapse of groundfish fisheries in the Northwest Atlantic and the severe overfishing of, particularly, cod and plaice in the North Sea. Although the bioecological component of sustainability, including the control of harvest rates, have been the overt primary focus of research and management efforts, harvest rates have far exceeded targets and limits and stock sizes have plummeted due to a combination of complexity/lack of knowledge and the covert pursuit of the short term bioeconomic component of sustainability.

Most fisheries are spatially highly diversified and complex, yet most existing assessment and fishery management tools cannot adequately take into account such diversity and complexity. Stock assessment science is mostly based on single species modeling which is unlikely to be appropriate to evaluate medium to long term strategies when competition, predation, and natural changes may be as or more important than fishing effort. The reliability of single species assessments has been

questioned, with changes in biomass estimates from year to year often larger than can be accounted for by fishing or by natural changes.

Fishery data, particularly those managed under Total Allowable Catch limitations, are of doubtful reliability. In addition, traditional fisheries science which seemed unaffordable for many of the smaller scale coastal fisheries has seen budget cuts which further undermines its work. There is therefore a need for innovative research and approaches to management exploring different tools and strategies to integrate scientific, traditional and user knowledge in fishery management systems that are more cost efficient and more effective. New governance approach, along the lines proposed by Mahon (1997), Berkes *et al.* (2001), Hilborn, Orensanz and Parma (2005) are more likely to be successful.

The almost exclusive focus on ecological sustainability (biological) in the past is probably one of the contributing factors to the currently perceived limited success of fishery management. Implied in that focus, was the understanding that fishery management would succeed in rebuilding all stocks of predators and preys at their optimal sizes and maintain them there. This was not only overly ambitious, bordering on the hubristic, it was impossible because climatic variability (whether natural or induced by human activities) would effect future abundance as would predator-prey and between species competitive relationships. Given the possibly intractable nature of the bioecological component of sustainability, it could be more fruitful to act on those components of sustainability, while still being compatible with the bioecological component, where fishery management is likely to have a more direct effect, i.e. the socio-economic, community and institutional components. Success would not only be easier to measure, it would also be easier to achieve. It would be of primary importance, however, that actions are compatible or at least neutral with the bio-ecological component of sustainability, even if the main objective were to improve on the other components.

4. GOVERNANCE

Poor governance, or the lack of good governance, characterized by limited legitimacy and lack of capacity, was identified as the main factor of unsustainability. Failure to have good governance, in itself, is sufficient for fishery management to fail. Management should aim at preventing conflict between countries and sectors, as a first step towards sustainability. This will require strong political will and increased capacity of interested parties. Measures to address the lack of good governance will vary with the specific case, but are likely to include at least some of: establishing more meaningful management involving at least harvesters and other interested parties, providing adequate and appropriate access rights to legitimate[2] fishers, fishing communities, or organizations, strengthening and coordinating nested organizations and institutions, and promoting education and awareness on basic fisheries management, leadership, compliance, and law enforcement. Many of these measures will also address issues related to inappropriate incentives.

Under good governance, governments would consider fully and explicitly the role that fisheries are to play in the economic make up of their countries. Governments would also ensure that the role they envisage for their fishery sectors is sustainable in all the dimensions of sustainability. They would be particularly careful to align the harvesting and processing capacities to the resources that are available and they should be watchful for the interactions between factors of unsustainability. A proper balance would be found between harvesting resources for national food security and for external markets. Achieving sustainability is often impeded because there is a lack of will to make management decisions or because decisions that have been made are not enacted either due to a lack of will or a lack of capacity to act on them. Strong institutions with the mandate to make necessary decisions and with the capacity to act on them are therefore needed. Governments should create appropriate management institutions where they do not exist (including recognising traditional arrangements and providing support) or reinforce them and make them more effective where they do exist. This strengthening should include, as a minimum:

[2] The definition of a legitimate fisher will vary from one fishery to the other. A legitimate fisher is one that is recognized and managed as such by the management system.

- receiving clear legal authority to manage fisheries and conserve resources;
- receiving both the mandate and the resources (human, material and financial) to ensure compliance with management and conservation policies and regulations;
- having effective dispute settlement mechanisms in their legal structure;
- performing regular performance evaluation of their policies in achieving their objectives.
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Under good governance, the institutional framework would be structured in such a way that the incentives are fostering the four dimensions of sustainability. For example, three of the dimensions of sustainability (bio-ecological, social and institutional) would be expected to be negatively affected in fishery management systems where monitoring, control and surveillance was insufficient to ensure compliance with the rules and regulations that have been adopted. In the short term individual harvesters may benefit from higher catches, but in the medium to long term, the economic component of sustainability would also deteriorate as the resources and their habitats are destroyed. Fishery management institutions should be appropriately funded, possibly through revenues generated by the fishery itself.

Effective institutions provide for transparent participatory management and the granting of a meaningful role to interested parties and stakeholders in the full range of management (e.g. planning, science, legislation, implementation). Under appropriate conditions, delegation of selected management functions to local institutions can be promoted.

For institutions to operate correctly, there is a need to promote capacity building and increase public awareness of the need for conservation and management, including for policy makers, members of the fishing industry, Non-governmental Organizations and the general public. The performance of the institutional framework should be evaluated periodically and adjustments should be made when necessary, particularly if some aspects are found to promote unsustainability.

Secure rights to resource users (individually or collectively) for use of a portion of the resource, space, or other relevant aspect of the fishery and rights to be involved in fishery management of non-fishing interested parties are seen as important tools/steps towards improving governance and improving sustainability and rights are discussed later in this report.

Fishery management has usually focused primarily on the bioecological component of sustainability, but has often failed even on this dimension of sustainability, possibly because it did not pay enough overt explicit attention to the other components of sustainability. Achieving sustainability requires a blend of a conservation perspective and the social and economic perspective of those directly associated with the fisheries. Either alone will not succeed. The social component of sustainability is insufficiently covered by fisheries management instruments in general. Consistent with a precautionary approach, the institutional framework should assess the uncertainties and adopt appropriate measures to address the interrelated risks in the economic, institutional, community and ecological dimensions of sustainability. Special attention should be paid to the interactions with other sectors of the economy and with the environment.

Under good governance, the interactions between the fishery sector and the other sectors of the economy would be explicitly recognized and taken into account because they have potentially large impact. These factors are traditionally beyond the control of the fisheries sector but improved governance and more effective institutions should help remedy that situation. Government departments responsible for fisheries must take a lead role in protecting the fishery, the resources, and their habitats from external threats of pollution and contaminants, habitat damage, etc. and in ensuring that the fisheries sector is recognized as a legitimate user in coastal areas.

Good governance is more likely to be achieved under flexible and responsive systems that can absorb fishery resource fluctuations and other shocks and uncertainties. This could involve filters to entry

rather than barriers and facilitation of exit strategies through diversification. The management system should be responsive and minimize time-lag because failure to respond sufficiently quickly compromises sustainability. Systems that delay responses risk collapse. It is not clear if governance systems characterized by more inclusiveness and decentralization will respond more quickly or more slowly. Both may occur. Fishery management requires taking action before it is possible to be certain of the consequences and hence involves taking risks. Innovation in fishery management is essential to improve sustainability, so sometimes large risks must be taken. Both fisheries and fishery dependent communities differ in their capacity to withstand harm, and this should be an important consideration when deciding how experimental to be in changing fishery management actions.

Emphasizing individual, institutional and societal flexibility and adaptation to change, whether humans or other components of nature cause the change, can provide alternatives to rigid or mechanistic perspectives on sustainability. As indicated above, humans should be seen as integral rather than external to the ecosystem. Ecosystem and human system integration is implicit in holistic treatment of sustainability. Achieving sustainability of fisheries-based livelihoods, for example, may well lead to rational short-term overexploitation of fisheries resources with the real fact-based expectation of medium to longer-term recovery to higher sustained catches. An approach that would treat humans as external to the ecosystem and that gave absolute priority to the bio-ecological component of sustainability would reduce harvest to protect the fishery resource with potentially disproportionately larger consequences on the human component of the ecosystem than on the fishery component. A similar reasoning can be developed for the economic component of sustainability.

Good governance would also take account of scale. The most appropriate scale for managing human actions may be different from that which is relevant for the bioecological component of sustainability. Multi-scale governance must be integrated effectively, the nesting of decisions must be streamlined and complementary, so the various scales work together towards a common goal and governance is expressed at the appropriate scale for each factor. Similarly, good governance systems comprises several interacting and overlapping layers of management at local (micro), national/regional (meso) and global (macro) scales. Fishery management is affected by global processes such as market liberalization and globalization. As globalization continues and affects fishery sustainability positively (Marine Stewardship Council) or negatively (increased demand), fishery managers as well as fishermen should evaluate the possible effects of globalization on short-term, medium-term, and long-term policies. Global issues, although they may involve all layers of management, would be expected to be the main responsibility, at least for coordination purposes, of the central fishery management agency while the daily operational management of the fishery would be expected to be the responsibility of local authorities. It is important that the roles and responsibilities of each party involved in fishery management be clearly identified and unambiguous.

Good governance would better coordinate the involvement of various government departments in fisheries in order that all four components of sustainability receive appropriate attention. Solutions to fisheries problems may be found outside the fishery itself and will require an integrated view of the social, economic, and ecological systems, each interpreted broadly.

Good governance provides access to information and decision-making to legitimate stakeholders and interested parties in order to decrease vulnerability to cronyism and politically favouring some (often short-term) interests over other (often long-term) interests. But good institutions are not enough are not sufficient to achieve good governance. The institutions need to include a balance of interested parties sharing a common goal in order to improve the probability that all components of sustainability will be pursued. Unsustainability in fisheries can also be related to the prevailing institutional attitudes in the fishery management process about nature, about management, and about how the fishery should function. Prior to the collapse of its groundfish fisheries in the early 1990s, the fishery management process on Canada's Atlantic coast had the attitude that its system was one of the best in the world and that fishery collapses were highly unlikely. That attitude has changed somewhat, but because there is no agreement on the main causes of the collapses, many parties continue to look for one culprit while it is likely that several causes were responsible and blame can be shared amongst all interested parties:

the scientific assessment were wrong, in part because of a change in the distribution of the fishes, monitoring, control and surveillance was inadequate with the results that large scale discarding and high-grading was common, and the main objective of individual participants was to increase their share over their neighbour's rather than protect the resources. Many other fishery management systems can be expected to share these characteristics, particularly large volume demersal fisheries in the north Atlantic. These fisheries have been conducted for centuries and fisheries science as well as science-based fishery management can be said to have originated for them. Yet, despite its long history and the large investments in fishery science and in fishery management, most large volume demersal fisheries in the North Atlantic have severely overexploited the resources and stocks are seriously depleted. It has been hypothesized that an explicitly stated exclusive focus on the bioecological component of sustainability while in reality short term socio-economic interests predominate may be at least partially responsible for the failure of fishery management in the area. An open and explicit consideration of socio-economic factors, instead of the current unstated and "shadow" one would be expected to be more conducive to reaching sustainability. At least, it would have the benefit of being transparent as to its objective. The exclusive overt focus on the bio-ecological component of sustainability is in large part due to the illusion of certainty and the fallacy of controllability, discussed in the section on uncertainties below.

While progress has been made in legal instruments, there is a fundamental issue about the compatibility of freedom of the high seas with sustainability because of the difficulty to deal with allocations. This is highlighted by the current difficulty that some regional fisheries management organizations (RFMOs) are having with the need to provide security of entitlement to present stakeholders in order to promote stewardship while also allocating shares to new entrants. Another dilemma is that nations are generally unwilling to delegate enough power to RFMOs as shown in the lack of enforcement and weak dispute resolution mechanisms, as this is seen as interfering with their sovereign rights. Yet the lack of effective decision making leads to unsustainability.

5. RIGHTS

Currently, a majority of fisheries are operating under a system of economic, social and institutional incentives that promote unsustainable practices rather than sustainable ones. In fully exploited or overexploited species, harvesters expect that management authorities will make decisions in the future that will be more restrictive and they feel that they should harvest as much as is possible as quickly as possible before things get worst. Even those who agree that more stringent management would be necessary to protect the resources do catch more at present because they have no confidence that they will be allowed to take part in the future benefits if they agree to restraints today. Their rational economic choice is to harvest as much as they can before either their catch is further limited or they are simply excluded from fishing. Such inappropriate incentives lead to a short-term view and overcapitalization as exemplified by the race for fish while lack of transparency and participation of fishers in the management system undermines confidence and willingness to support management measures. In the absence of appropriate incentives, participants in fisheries and in the fishery management processes cannot be expected to pursue any other objectives than those related to their immediate well-being.

Measures that can give appropriate incentives include: (i) assigning secure rights to shares of fisheries, e.g. in terms of areas, effort units or catch; (ii) using market measures (e.g. certification) to discourage unsustainable fisheries; (iii) allowing all legitimate stakeholders (interested parties) to participate meaningfully in fisheries management including setting objectives, providing input to science, evaluating options and reviewing performance relative to objectives. Meaningful participation will vary geographically and by culture but it should always be transparent and provide full access to information.

The granting of secure rights to resource users (individually or collectively) for use of a portion of the catch, space, or other relevant aspects of the fishery as well as the granting of rights to participate in the fishery management process to legitimate interested parties holds the greatest promise to improved

governance and better managed fisheries. The granting of secure rights is the most important step towards reducing the undesirable effects of inappropriate incentives and lack of good governance as factors of unsustainability. The allocation of rights is expected to improve the bioecological, economic and, possibly, institutional components of sustainability, but if handled incorrectly, it could negatively impact the social component. Before rights can be allocated, however, outstanding conflicts must be resolved.

The granting of rights, whatever the form, will likely result in some potential participants (individual or communities, etc.) being excluded either when the rights are allocated or later, when the rights are consolidated. Mechanisms should therefore be put in place to distribute equitably the benefits from the fishery such that those that are excluded from the direct benefits that improved governance and sustainability resulting from the assignation of rights bring, can benefit indirectly. Use rights should therefore be designed to satisfy societal views of fairness and equity. For example, benefits from more efficient fisheries management may be used to create alternative employment opportunities rather than allowing more participants in the fishery: the fishery cannot be expected to solve the problem of poverty and lack of employment. Improved management can be used to alleviate poverty, inadequate management will only make it worse.

The allocation of rights to participate in the fishery need not be allocated to individuals: depending on the specifics of each case, the allocation can take several forms, including communities, individuals, and corporate or social groupings. It is considered essential that the most appropriate form of rights (to fish or to participate in the fishery management process) be given to the most appropriate entity on a case by case basis. The scale of rights would be expected to differ for different types of activities: for example, any member of society could be given the right to participate in the strategic planning of the fishery, while participating in the operational management of the fishery (opening and closure dates, etc.) during the season would be expected to be restricted to those having a direct interest in the fishery. It is therefore necessary to identify the appropriate time scales, processes and responsibilities of the various interested parties for: policy (long term, large scale), development planning (medium-term, national/local scale) and management (short term, local scale).

Failing to resolve conflicts before allocating rights or to match the type of rights and mode of implementation to the specific conditions of a fishery can create additional problems without mitigating any existing ones. Even when appropriate forms of rights are implemented in a fishery or a community, successful fisheries management is not guaranteed. Fishery management is an ongoing process that requires continuous attention and adjustments. Things can go wrong with how the rights are exercised, or how decisions are reached within the rights-based management systems.

Although rights may have been allocated to various sectors of society, including communities, individuals, and corporate or social groupings, the ultimate responsibility to achieve sustainability under its four components rests with the State. It is important that parties involved in fishery management are aware that if they fail to meet the requirements of their duties to achieve sustainability, someone else will make decisions in their stead.

As indicated above, the allocation of rights has the potential, initially, to deteriorate the social component of sustainability if handled incorrectly. However, if handled correctly, and under appropriate institutions and good governance, the allocation of rights should also help to alleviate poverty without necessarily increasing fishing effort: improving governance, providing social services and building human and social capital all serve to reduce vulnerability and livelihood insecurity. Reducing vulnerability through empowerment of fishing communities means that more solutions are available to achieve the four components of sustainability than pessimistic assessments of Malthusian crisis in the small-scale sector might suggest. Reduced vulnerability also helps to build a sense of resource stewardship. With increasing security comes increasing concern for the long-term future, including intergenerational concerns.

Poverty alleviation and prevention can be achieved through pro-poor access regimes favouring those with few other opportunities or assets. Some exclusion may be necessary, however: pro-poor policies do not imply that everyone can get in the fishery. Re-allocating resources to favour the poor will not be easy. Where economic benefits can be extracted from resources, those who have economic and political power will tend to control access and revenue flows. Few governments are willing or able to challenge the power and authority of local elites who are currently the main economic beneficiaries from fisheries. Access to the fishery should be seen as a tool to achieve the goals society has set. Fishery ministers therefore have to make tough decisions not only related to the bioecological component of sustainability through lower TACs or fishing effort, they also relate to changing the balance of power either through access and allocation, or through improved, efficient and equitable institutions, or both.

As suggested above, improperly handled allocation of rights, or properly handled allocation in poor governance systems can be detrimental to sustainability, and can result in unbridled capitalism where workers rights, society in general, governance and the social and institutional components of sustainability are suffering. This must be guarded against. Improper allocation of rights, or proper allocation in poor governance systems has been observed to improve the bioecological component of sustainability in the short term, but the social and institutional components have suffered resulting in medium term unsustainability. In order to improve on the social and institutional components of sustainability, it may be necessary to not pursue the maximum benefits under the economic component of sustainability by restricting the "transferability" of rights and limiting the leasing of rights and other capitalistic arrangements whose sole purpose is to make money without regards to the other three components of sustainability. One possibility would be to assign rights only to those who earn a livelihood by being active in the fishery. The access rights to the sea can be restricted to an inshore littoral zone that can be appropriately defined according to the ecological and socio-political context of the country concerned. To ensure sustainability of the community, it is equally important to ensure their priority rights to the coastal zone contiguous to the sea, over and above the claims made by others.

Economist Ian Smith (1981: p. 22) points that often fishery management programs "fail to deal adequately with fishermen who are displaced" and that accordingly policies to deal with overexploitation and overcapacity by reducing the number of fishers may well aggravate the fishery problem. The challenge of livelihood diversification is by no means simple, yet efforts in this direction seem critical to the success of programs for sustainable fisheries. Such efforts will typically be composed of within-fishery and non-fishery actions. First, within the fishery, it can be useful to encourage multi-species fishing, in which each fisher utilizes a range of fish resources, in contrast to policies that lead to specialization in single-species fisheries (Hilborn *et al.*, 2001). By diversifying across sources of fish, the individual fisher reduces risks, and the collective pressure to overexploit may also be reduced. Second, looking beyond the fishery per se, it can be useful to encourage multiple sources of livelihood for fishers (with fishers holding a range of jobs in addition to fishing). This is common as a traditional practice in many seasonal fisheries, and lets fishers avoid total reliance on fishing for their income, reducing the pressure they would otherwise face to obtain a livelihood entirely from the fishery, and thus reducing pressure on the fish stocks. Third, there is a need to diversify the coastal economy, by creating new, sustainable economic activity outside the fishery sector (e.g., fish farming, coastal tourism). This enhances the range of available livelihood choices and tends to increase incomes outside the fishery, so it is more attractive for fishers to leave the fishery, and incentives for others to enter are reduced.

Of the three tools listed at the beginning of the section, only the allocation of rights and, accessorily, allowing all interested parties to participate fully in the fishery management process have been discussed so far. The third measure, market tools, has begun to be used on a small scale, with the most visible initiative being the Marine Stewardship Council (MSC) that certifies fisheries as being sustainable. Being certified as being sustainable by a reputable organization provides added value and better access to markets that are increasingly sensitive to the unsustainability of fisheries. While the Marine Stewardship Council goes through a rigourous, documented and reasonably transparent

process for certification, other schemes are less thorough and their classification is not always based on the most up-to-date and neutral information. As a result, the good intentions of these organizations may materialize into unnecessary restrictions being placed on some products. There is therefore a need to improve the flow of information if market tools are to be used effectively.

So far, this section has discussed the positive incentives associated with the allocation of rights, with the inclusion of all interested parties in the relevant part of the fishery management process and with the sustainability benefits that market tools can bring. With the allocation of rights, however, come responsibilities. One of them is to implement measures and processes that will provide for a reasonable balance of the four components of sustainability. Another one is to evaluate the measures and plan for contingencies should the measures not work as expected. Those holding rights to be involved in the fishery management process also need to be accountable for their decisions and their actions. In particular, if those involved in fishery management decision-making operate in a system where they can reasonably expect to be rescued by a higher order of government (through subsidies, income assistance, etc.) from the consequences of actions that may lead to stock collapse, they can be expected to be more willing to risk the bioecological component of sustainability for short-term economic or even community gains.

6. CAPACITY BUILDING

Formal fishery management, where it exists, involves a large number of people. An overwhelming majority of those who participate in formal fishery management want to achieve at least bio-ecological and economic components of sustainability, but their good intentions have not resulted in favourable outcomes under the four components of sustainability. The causes of this lack of success are certainly numerous, but part of the reason is that fishery management, as implemented, is based on relatively simplistic assumptions about the functioning of the ecological component of the fishery system. Another, related reason is that fishery management systems are not the result of a grand design; they have slowly evolved to try to progressively adjust to the increased perceived complexity of the biological component of the fishery system. A third reason is that most fishery management systems have paid little attention to the human and institutional components of the fishery system. There is a widespread need for capacity building, training, education, awareness building, and sharing of knowledge relevant to fisheries management for all stakeholders in order to address these three causes of the poor performance of fishery management processes as well as policy makers and the public at large about main fisheries issues.

Fishery management has been operating under the assumption that fishing is the main cause of changes in the abundance of fishery resources. Although it is true that fishing effort can be a major reason for changes in fishery resources abundance, it is not the only one, and often, not the main one. Failure to recognize the possibility that changes in resource abundance can be and are often due to other sources has resulted in decreased confidence in the fishery management processes. In addition, under single-species approaches, fishery management has attempted to simultaneously reach incompatible biomass targets for species of predators, preys and competitors without taking account of the interactions between species. The complexity of fisheries systems as well as inadequate information and understanding make it hard to identify with certainty the outcome of specific management actions, particularly when multispecies and ecosystem considerations are taken into account. In such a context where the bioecological outcome is highly uncertain due to complexity and lack of knowledge, decision-making must take into account other components of sustainability and cannot be based solely on the predicted bioecological outcome. Success under those components is not only easier to measure, it is also more likely to be achievable given appropriate institutions with the will to make the appropriate decisions and implement them.

There are few fishery management processes where all interested parties have the capacity to participate meaningfully in all aspects of fishery management. In addition, the theory and implementation of "best practices" continue to evolve. There is therefore a need for capacity building and continuous education for co-management and other forms of participatory management; to

develop decision-making, facilitating and modelling tools in order to design and implement decision-making processes that are legitimate, transparent and representative. The capacity to interact constructively in productive and efficient processes is as important as the knowledge acquisition normally associated with capacity building.

Fisheries authorities need to provide the resources necessary for all aspects of management of the fishery. Fisheries are complex systems with strong interdependencies between social, economic and bioecological factors that are poorly understood. The knowledge needed to deal with them is largely insufficient. Fisheries authorities should:

- improve data collection (e.g. fisheries statistics) and fisheries monitoring including systems of indicators;
- support sustainable scientific programmes for fisheries assessment (not necessarily stock assessment), formulation of advice, evaluation of policies and management performance;
- promote the integration of fishers' and scientific knowledge; and
- build capacity for management.

In order to have fully functional institutions that have the potential to improve governance, the usual focus of fishery management needs to be extended beyond the biological component so that economic and social components (the latter considered to be insufficiently covered by fisheries management instruments). Generally speaking, improving on the long term economic and social components of sustainability, in good governance systems, will also improve on the bioecological component. Problems may arise in the short term, however, where compromises may need to be made.

There exist considerable insights in the functioning of fisheries of all scales and how to improve on various components of sustainability. Existing management systems are not conducive to taking full advantage of those insights. Better use should be made of those existing insights, from a variety of perspectives and disciplines (organization & change management, policy analysis, social psychology, history, geography, demography) that are currently underused. Economics, sociology, anthropology and development studies are better known but still need a means to better integrate their insights into informing policy and management. Mechanism to set priorities for research and information gathering that are tailored to the needs of the fishery management agencies, not those of the scientific organizations are also needed.

An increasing number of developing countries have adhered to international fisheries instruments over the past few years. Implementation of these instruments is a formidable challenge for the fisheries authorities of these countries, which in most cases suffers from a lack of human and financial resources. Therefore, these countries not only need capacity building, they also need additional human and financial resources. It is particularly important that these countries be given, or gives themselves, the means to become equal partners especially when they are members of international organizations in order to be able to stand their grounds on an equal basis. Whatever improvements in capacity building are made, there is also a requirement to adjust the expectations to what can be realistically be achieved by fishery management. There is an unjustified expectation that management can have a larger impact than is actually the case. This topic is addressed under the heading uncertainties below.

7. THE ECOSYSTEM APPROACH

The ecosystem approach (EA) is widely promoted and accepted as an avenue to improve fishery sustainability. The analyses presented and the discussions during the workshops suggest that there is not a unique understanding of what the ecosystem approach is and the potential benefits of implementing the EA are context-sensitive: depending on the fishery, it may improve some components of sustainability, but it may make it more difficult to achieve sustainability under the other components, depending on whether the implementation of the ecosystem approach is broad or narrow.

Conceptually, the implementation of a true ecosystem approach in which humans are considered part of the ecosystem, should result in improvements under the four components of sustainability. A narrow implementation of an ecosystem approach, however, not taking into account the human dimension, may result in an imbalance in the attention given to the four components of sustainability, with a bias towards favouring the bioecological component. Whether the implantation is broad or narrow, an ecosystem approach will necessarily require trade-offs to be made.

A broad implementation of the EA could work in synergy with a sustainable livelihoods approach in achieving sustainability. The two approaches have different entry points, most implementations of the EA have generally been more concerned with the bioecological component of sustainability while the sustainable livelihood approach is more concerned with the human component. The two approaches, however, do seek the same objectives and they could easily be reconciled to mean a common approach. The tools and information requirement for each approach are different however, and so are the benefits. From a human development perspective, the livelihood approach would be expected to bring more rapid pay-offs at lesser costs. A narrow implementation of an ecosystem approach, focussing mostly on the bioecological component, could imply huge costs of increasing knowledge with few immediate benefits to society, particularly in developing countries. With appropriate institutions and governance system, it should be possible to implement science-based approaches, in the context of a management objective driven process, at minimal incremental costs with respect to increasing knowledge.

An ecosystem approach also means that the fishery sector should be treated as one entity rather than trying to manage each single species fleet. Some form of portfolio management (Hilborn *et al.*, 2001), where boats would be expected to move in and out of specific fisheries as required by changes in the relative abundance of the different species, or as market conditions change.

8. TRANSITION COSTS

Overcoming the transition costs to improve governance is a key barrier to sustainability. The costs are monetary, social, and political. There are always costs, but they may not be known, minimized or equitably distributed. Thus, it is not enough to espouse a vision; it is necessary to plan and manage the transition. There are many ways to get from the current poor governance situations to governance situations deemed better for sustainability. Although the desired transition path will, to some degree, be dictated by the current situation (i.e. the departure point), the choices that will be made will influence the amount, type (monetary, social or political) and distribution of costs. Exclusion costs, associated with the assignment of access rights, can be particularly problematic. In some communities, fishermen prefer to remain collectively poor together rather than excluding some in order to better protect the resource and/or to allow improving the economic situation of a small number of them. In such cases, it is important that any pathway to increased sustainability explicitly incorporate an equitable solution for those that may be left out of the fishery. It is therefore not enough merely to adopt a rights-based management system; plans must be made to take care of those excluded from participation when the rights are allocated.

9. UNCERTAINTIES

While the great uncertainties inherent in fisheries are well documented (see section on Ecosystems and variability above), some management systems tend to ignore major elements of uncertainty to create an "illusion of certainty" (Charles, 2001). This is particularly common in fisheries managed by total allowable catches (TAC). In these fisheries, it is not uncommon to witness minor changes in TAC of less than 10 percent, yet stock assessments for a given year commonly change retrospectively by more than $\pm$ 25 percent. The illusion of certainty is further compounded when the agreed TAC is subdivided among fishing sectors or individual fishers, and the resulting allocations are treated as fixed within the fishing season whether the fish show up in the expected amount, in greater amounts or in lesser amounts, and regardless of whether the stock assessment is correct or not. The illusion of certainty is that the TAC is interpreted as a pie whose size is precisely known and can be cut into several

precisely-determined shares. A better approach would be to acknowledge and accept that uncertainties are large and deal with them using adaptive management approaches, in which fishing plans are designed to have the ability to adjust to unexpected changes in the natural world during the fishing season.

The illusion of certainty is closely linked to the fallacy of controllability (Charles, 2001). Understandably, fishery management systems rarely recognize that fisheries can be only partially, and imperfectly, controlled. Fishery management processes give the impression that more can be known, and more controlled, than can be realistically expected. The section on Ecosystems and variability above deals briefly with the natural changes that are outside the reach of fishery management, but other more mundane examples can be given. TAC managed fisheries assume that once set the TAC will be implemented, yet most fishery management systems rely on controlling the landings, not the catches. If there are differences in price according to the size of fish of a given species, high-grading, i.e. keeping only the most valuable specimens of 9 given species, can be expected in fisheries under individual quotas. In fisheries with trip limits, catches in excess of the limit are normally discarded at sea. Measures can be taken to mitigate these effects, or sampling programmes can be designed to quantify the missing catches, but they are the exception rather than the rule. Recognizing that human behaviour is difficult to control is the first step towards the development of management measures to optimize overall sustainability of inherently uncontrollable fisheries.

The illusion of certainty and the fallacy of controllability, however, should not paralyse fishery management agencies. Some common events are predictable and fishery management should decide ahead of time how they will react when these occur. This is the essence of "anticipatory decision-making", related to but separate from the precautionary approach often mentioned in Conventions, but it is very rarely applied in practice. The management issue is to develop and state how various anticipated situations will be dealt with so as to achieve the goals of the fishery management agency. The technical details of how to approach this will vary with the situation – from expert opinion to fully quantitative analysis – but it is important to promote the need for anticipatory responses in fishery management.

10. INTERACTIONS

The relative importance of the various factors of unsustainability varies according to the type of fishery under consideration. Further, the linkages and interactions between the factors of unsustainability are complex and it is often the failure to recognize and take into account the interactions between the factors that have impaired past management attempts.

Win-win management options to improve sustainability remain elusive. It seems that pathways which offer potential for major reductions in the effects of a dominant factor of unsustainability on a particular dimension of sustainability can be expected to increase the risk that other factors will be expressed more strongly on other dimensions. For example, reducing participation in a fishery by allocating rights, should improve on at least the economic and on possibly also on the bioecological components of sustainability, but, if done without a plan to compensate equitably those left out, would cause a deterioration under the social (and possibly institutional) component of sustainability.

Game theory says that games where the risk and payoff schedules are asymmetric are particularly hard to win, but there can be winning solutions, at least in some cases. In a fishery management context, identifying those factors and strategies that will produce sustainable results under the four components of sustainability requires knowing the nature of the asymmetries and how they may change over time. In a fishery management decision modelling context, inaction almost always ensures a poor outcome, but even a well-chosen action cannot ensure a good outcome. In this context, it is not surprising that inaction is often chosen.

Figure 1 from Workshop 1, illustrates the dynamics of a fishery system under no management, or ineffective management. The figure shows the links between the resource, the fishery, the

environment, the investment etc. and where management could take place, e.g. investment, market, capacity or even after the fishery has collapsed through compensation. The figure shows that interactions can occur at several points.

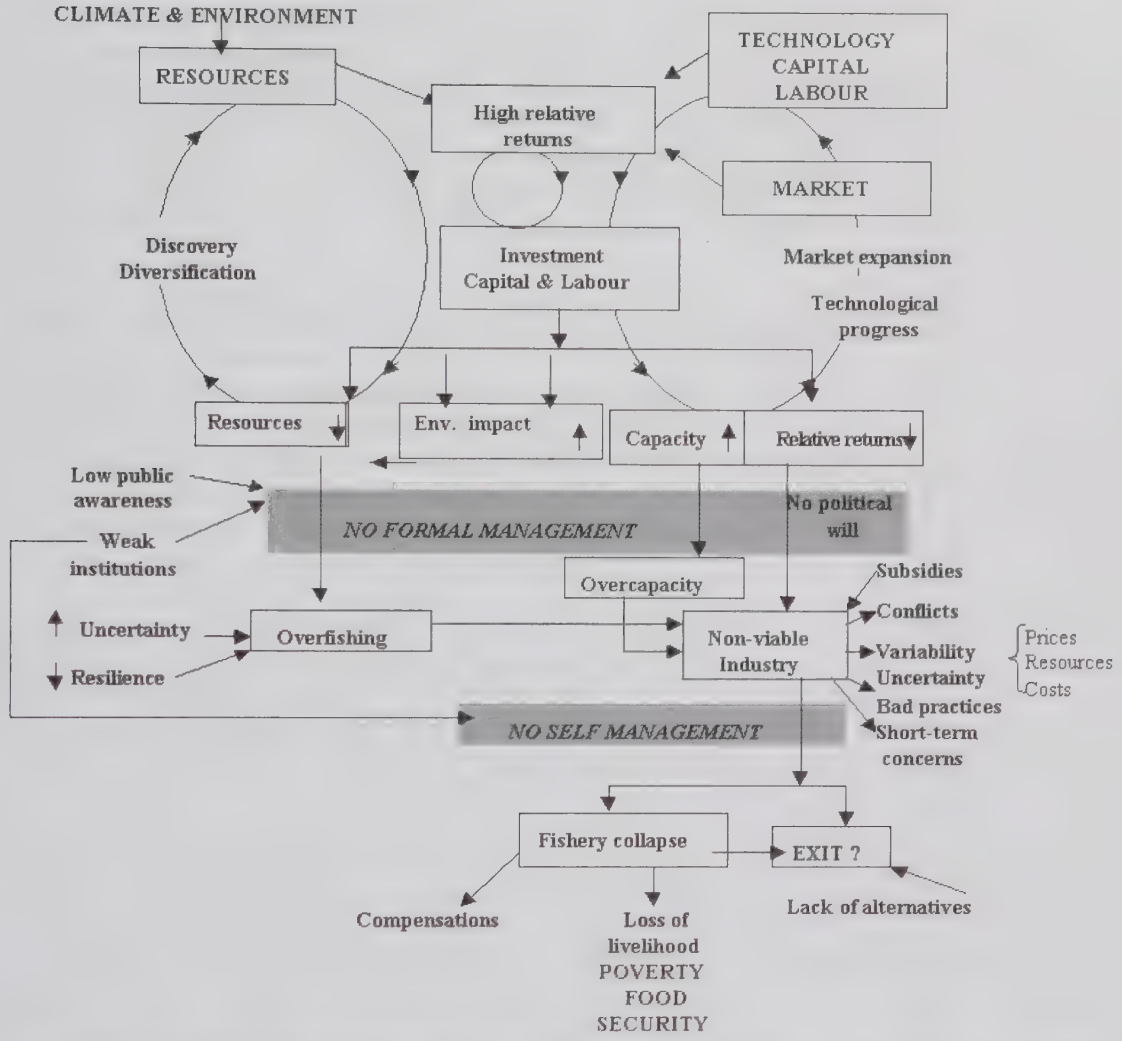

Figure 1: Dynamics of unsustainability under no management (from the report of Workshop 1)

Increased transparency and participation in the fishery management process can be used to illustrate how interactions can happen. There are many reasons to broaden participation in governance of fisheries, e.g. the objectives of fishery management can be expected to better reflect societal views, the knowledge bases for decision-making would be expected to be greater, and the governance system would be expected to be improved, leading to easier implementation of the fishery management measures. However, experience shows that participatory decision-making is costly, time consuming, and changes tend to be made incrementally and slowly. Avoiding stock collapse may require swift decision making that may not be compatible with such participatory slow decision making. This raises the possibility that although benefits are expected from increased participation in most situations, there are instances where the benefits might be offset by the inability to act decisively in the face of a crisis. This shortcoming, however, could be mitigated by well-specified control rules or contingency plans (the anticipatory decision-making referred to earlier) that accelerate decisions when needed.

Fishery management is not a simple process of identifying and correcting a set of problems. Instead, as management progresses some problems (factors of unsustainability) are resolved but others arise; and the nature of the factors may change in the sense that what leads to unsustainability under one set of

management arrangements may not do so under another. Moreover, as one dimension of unsustainability becomes less of a concern, other dimensions come to the fore.

11. BALANCE BETWEEN THE COMPONENTS OF SUSTAINABILITY

The thesis presented in this summary of findings, which also underpinned the three workshops, is that for fishery management to be successful, a reasonable balance of the four components of sustainability should be sought. Some could argue for a primacy of the bioecological component of sustainability based on the argument that having a resource to exploit is the very foundation of fisheries. This point of view would be expected to be pushed with particular strength in cases where all components of sustainability are so severely compromised that making some progress towards improved sustainability may seem to require momentarily giving absolute priority to the bioecological component of sustainability.

The need to have a resource to exploit in order to have a fishery is an accepted fact. The best means to achieve the bioecological component of sustainability, however, is debatable. In cases where maximum (or optimum) economic yield (MEY) occurs at a fishing mortality rate that is lower than that providing the maximum sustainable (physical) yield (MSY), aiming for MEY instead of MSY would in fact have a higher probability of achieving the bio-ecological component of sustainability. Similar arguments could be constructed for the social and institutional aspects of sustainability where some fishery configurations would be expected to lead to better outcomes under those two components.

Giving absolute primacy to the bioecological component of sustainability in cases where all components are severely compromised could in fact be counterproductive. In the end, it could be more costly in enforcement and less successful than taking the time to develop a solution that will be accepted by all interested parties, which should decrease the costs of implementation and enforcement, and having the support of a majority of participants, will have greater chances of being successful.

Aiming for a reasonable balance between the four components of sustainability also provides a better basis for the evaluation of management. Systems that give absolute primacy to the bioecological components of sustainability will take measures that have the highest probability of success, regardless of the consequences on the other components of sustainability. More balanced systems could choose other measures, perhaps with slightly lower probabilities of achieving the bioecological components, but with substantial measurable effects on the other components of sustainability. In more balanced systems, benefits could be obtained on the economic, social and institutional components of sustainability even if one of the stocks did not rebuild. More balanced systems would try to manage what can be managed and guard against deteriorating the bio-ecological component of sustainability.

Giving absolute primacy to bioecological component of sustainability also risks drifting towards ecological fundamentalism. Avoiding unsustainability of fisheries resources could become an end in itself rather than a means to sustain the livelihoods of seafarers. As powerful environmental groups play more active roles in the fisheries arena the emphasis could turn from fisheries management in terms of sustainable use to fisheries preservation. Some of this drift can already be observed for the more charismatic species.

Fishery management systems with a good balance between the four components of sustainability should lead to responsible fisheries that are sustainable, producing optimum equitably distributed benefits for society, while preserving the functioning of marine ecosystems.

12. IMPROVING INSTITUTIONS

The limitations on what is possible to achieve through conventional fishery management under existing institutions are clear. Improvements could be expected with more resilient and more robust institutions.

The idea of resilience was first introduced to describe the capability of ecosystems to absorb unexpected shocks and perturbations (whether due to natural or human actions) and "bounce back", without collapsing, self-destructing or otherwise entering an intrinsically undesirable state. As Holling (1973, p. 17) wrote: "Resilience determines the persistence of relationships within a system and is a measure of the ability of these systems to absorb changes of state variables, driving variables and parameters, and still persist." The concept of resilience applies beyond ecosystems, implying that not only the relevant ecosystem, but also the human and management systems are able to absorb shocks, such that the system as a whole sustains (on average) a reasonable flow of benefits over time. Thus the various components of sustainability have resilience counterparts, which must equally be taken into account. In a fishery, we can envision resilient fishing communities, a resilient economic structure in the fishery, a resilient ecosystem in which the fish live, and resilient management institutions. A key issue, then, is: What policies and management approaches contribute both to sustainability and to resilience in fisheries? For example, Folke and Berkes (1998) argue that it is necessary to diversify institutional arrangements to build resilience into institutions such that the interactions between the natural system and the social system interactions are more responsive to feedbacks.

One ingredient in moving towards sustainability and resilience lies in pursuing robust management – providing "reasonable" success in meeting society's objectives, even if: (a) the current understanding of the fishery (notably the status of the resources), its environment and the processes of change, turns out to be incorrect, and/or (b) the actual capability to control fishing activity is highly imperfect. In other words, a robust management system is one in which obtaining reasonable performance from the fishery (i.e., reasonable success) does not depend on perfect knowledge of the structure and dynamics of the system, nor of all variables. Clearly this is not easy to achieve: moving towards robust management would seem to require more than minor changes – indeed, a re-thinking of the philosophy of management, and a re-assessment of current management approaches.

In this context, efficient policies are those that "do the most with what we have" – those that best meet society's objectives given the existing constraints. Hence, the pursuit of efficiency is desirable, by definition. However, pursuit of efficiency is meaningless, and potentially misguided, without clearly defining what objectives are pursued. In particular, it is sometimes thought that efficiency means generating the most profits (or rents), but this is not the case unless the fishery has no other goals (e.g. employment, community health, safety, etc.). In other words, it is only when a decision has been made on the balance among the many fishery objectives that it is possible to properly refer to what makes an "efficient" fishery. Without this, claims of greater "efficiency" for one policy over another may merely reflect the personal preferences of those advocating the policy.

A wide array of management measures is available in fisheries, each with its advantages and disadvantages. An overemphasis on any single measure is unlikely to lead to sustainability and resilience, as there will always be some situation in which any such method fails – whether dumping and highgrading with quota management, an inability to control enough fishery inputs with effort management, or excessive exploitation on unprotected parts of the stock (or distinct sub-stocks) with closed seasons and closed areas. The point is that any single management measure cannot be considered "safe". A portfolio (set) of mutually-reinforcing management tools is needed, selected on a case-by-case basis, taking into account society's objectives, biological aspects of the resource, human aspects such as tradition and experience, the uncertainty and complexity in the fishery and the predicted consequences of the various instruments.

13. CONCLUSIONS

There seems to be a consensus that governance of fishery systems need to be improved considerably if the four components of sustainability are to be achieved. The tools and human resources are there to improve governance, but the history of existing institutions may be such that it would be difficult for them to evolve towards improved governance. Large changes may therefore be necessary and those should involve all interested parties as equal partners in moving towards improved governance – none of the interested parties, including scientists and fishery manager, can claim special status. The few

cases that seem to have achieved improved governance have done so through innovative thinking, and there is no doubt that further innovation is needed: the impediments to improved governance are numerous and widespread.

ACKNOWLEDGEMENTS

By design, this paper was not intended as an original reflection on factors of unsustainability. Therefore, the paper draws largely on the discussions, conclusions and material submitted to the three workshops organized by the project. Participants to the workshops and authors of papers presented at the workshops are gratefully acknowledged. Any misinterpretation or misrepresentation of the authors' original intent is this author's responsibility.

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APPENDIX B

REVIEW OF FACTORS CONTRIBUTING TO OVEREXPLOITATION AND UNSUSTAINABILITY IN FISHERIES

A discussion on the methodological approach of FAO Project GCP/INT/788/JPN

by

Clotilde Bodiguel and Stephen Cunningham

FAO is currently undertaking Project GCP/INT/788/JPN: Review of factors contributing to over-exploitation and unsustainability in fisheries. The long-term objective of this project is to improve the management, hence the sustained production from, and the conservation of, the world's fisheries, with emphasis on developing ways and means to better address major factors of overexploitation and unsustainability.

Overexploitation and fisheries unsustainability have long been the major concern of fisheries managers and policy-makers. Various factors have been identified as being responsible for unsustainability, in particular the prevalence of relatively open-access conditions not only in the high seas, but also in most other fisheries. To address this problem and others, the international community has adopted a number of international fisheries instruments, including the United Nations Convention on the Law of the Sea (UNCLOS), the Code of Conduct for Responsible Fisheries, the UN Fish Stocks Agreement, and more recently, International Plans of Action to deal with fishing capacity and illegal, unregulated and unreported (IUU) fishing.

Notwithstanding such progress, the factors contributing to fisheries overexploitation and unsustainability had never been systematically identified prior to this project. Moreover, most international fisheries instruments have yet to be implemented adequately, partly because of the time lag between the adoption of measures and their implementation.

The aim of the project is systematically to address the factors contributing to unsustainability, and to investigate their relationship with the main international fisheries instruments. The project has proceeded on the basis of three international workshops leading to three regional workshops on recording and validating results.

The purpose of this paper is to review the methodological approach taken by the project and to compare it with the approach used in existing methods aimed at conducting similar assessments or analysing similar issues. In this regard, two aspects of the project will be described:

- The methodology implicitly used to explore and develop a fisheries approach through unsustainability;
- The hypotheses and methodological positioning of the "unsustainability approach" as they are developed at this stage of the project.

The paper is structured as follows. Section 1 reviews the approach taken implicitly by the project, by outlining the results of the three workshops concerning the identification and analysis of factors of unsustainability (origin of problem) and the implementation of management policies or policy instruments (issues and possible solutions). Section 2 attempts to formalize the approach explicitly. Section 3 briefly evaluates the use of known factors of unsustainability as a point of departure to evaluate fisheries management policy and to delineate the main lines of an unsustainability approach on the basis of the first three workshops. Section 4 compares the approach taken in this project with that taken in other major approaches (such as SWOT: Strengths, weaknesses, opportunities, threats]

analysis, rapid appraisal, systems analysis and policy-institutions-processes analysis). Section 5 compares the approach based on unsustainability factors with two others approaches, recent or in progress, which are used for major international programmes: the approach relating to sustainable livelihoods in artisanal fisheries and the transboundary diagnostic analysis (TDA). Section 6 examines the applicability of the factors approach and the follow-up to the project.

1. REVIEW OF THE IMPLICIT APPROACH

The aim of the project is to address issues related to factors of unsustainability and the overexploitation of fisheries in order to improve fisheries management, in particular with respect to action that could be taken towards improving sustainability and food security in general and in particular towards the implementation of major international fisheries instruments.

In order to achieve its aims, the project has proceeded through a series of international workshops. In order to discern the implicit approach, the three workshops held so far are reviewed briefly.

The three workshops centred on groups of experts who were invited for their personal skills rather than as representatives of institutions.

- The first workshop was held in Bangkok, Thailand, from 4 to 8 February 2002 (Gréboval, 2002).
- The second workshop was held in Mauritius, from 3 to 7 February 2003 (Swan and Gréboval, 2004).
- The third workshop was held in Siem Reap, Cambodia, from 13 to 16 September 2004 (Swan and Gréboval, 2005).

Experts were invited in their personal skills rather than as representatives of institutions. They came from a wide range of countries and disciplines relevant to the question of fisheries management and unsustainability. The Bangkok Workshop was organized on the basis of an expert group, bringing together 24 experts from 18 countries. The second workshop led on from the previous one, bringing together 31 experts from 23 countries. Of the 31 experts, only 11 (12 including the facilitator) had attended the first workshop, although some experts who had attended the first workshop submitted a paper to the second workshop but were unable to be physically present. The third workshop, again organized according to the same principles of diversity and relevance, included 25 experts from 11 countries. Of the 25 experts, only five (six including the facilitator) had attended both of the previous two workshops, and 6 had attended one of the previous two.

The workshops took place as follows:

Workshop 1

The first workshop addressed five key questions:

1. What are the key factors contributing to fisheries unsustainability and overexploitation?
2. How do these factors interact in general and under major fisheries management systems?
3. What are the priority issues in addressing fisheries unsustainability and overexploitation?
4. What are the best practical approaches to address these factors in order to contribute to responsible fisheries management?
5. How are factors addressed in international fisheries instruments and are current instruments sufficient to address the factors?

The proceedings of the first workshop were organized around two main discussion papers. The first paper covered the first four questions in the list above and most time was devoted to it and discussion of the issues it raised. The second paper dealt exclusively with the fifth question.

In each case, the approach adopted was for the paper to be presented to the plenary session. Participants were then invited to comment upon it. They were also given the opportunity to table supplementary information in the form of notes and comments, which were included in the published proceedings.

Following the presentation and discussion of the first paper, the group was asked to address two main issues:

- To identify the key factors of unsustainability and the relationships between them.
- To relate the key factors of unsustainability to fishery management (methods and approaches).

In preliminary discussions, it became apparent that the experts were divided as to how best to address these issues. One group preferred to adopt a matrix approach, which they felt would enable more systematic investigation of the individual factors of unsustainability and their relationship with the fisheries management process. A second group preferred to adopt a pressure-state-response approach, wherein they first identified sources of pressure in the system, how the system responded and what policy measures should be adopted. The plenary decided that both methodologies had merit. Two sub-groups were therefore formed to analyse the issues raised above using the two methodologies.

After working separately, the two groups presented their results in plenary. The results, in terms of identifying factors and actions, were largely the same, regardless of the approach taken. A consensus view emerged though debate allowing a set of summary conclusions and recommendations[2] to be adopted (Box 1).

Having identified the key factors and the possible solutions, the workshop made a number of recommendations concerning requirements to address each of the factors and also for future work within this project. In the latter case, emphasis was placed on the development of case studies because of the location-specific nature of many problems. The workshop stressed that although general principles can be identified, their application is necessarily local in nature.

The workshop then turned its attention to the relationship of factors of unsustainability to international fisheries instruments. A discussion paper was presented to, and discussed in, plenary. A number of conclusions and recommendations emerged from this presentation and discussion:

- Existing international instruments address many of the factors of ūnsustainability. The problem is not to devise more instruments but to ensure effective implementation of those that already exist.
- A more detailed analysis should be undertaken of existing instruments against a more precisely defined list of factors.
- Regional fishery bodies play a key role in many instruments and they need strengthening as appropriate.

[2] The main conclusions of the workshops are presented in Boxes 1 to 3. For further details please refer to the corresponding publications and the paper by J.-J. Maguire (*infra*).

Box 1: Summary of the main results of Workshop 1

In particular, the group noted:

- The inevitable link between an unsustainability approach and the more traditional sustainability one
- The fundamentally economic nature of many of the factors leading to unsustainability
- The essential role played by institutions and governance in seeking solutions.

The discussions undertaken in the sub-groups enabled a great many factors of unsustainability to be identified. These factors were organized into six main groups:

- Inappropriate incentives, including market distortions (incentives to fishers that promote unsustainable practices)
- High demand for limited resources
- Poverty and lack of resources
- Complexity and lack of knowledge
- Lack of governance
- Interactions between fishery sector and other sectors, and with environment.

The discussions also identified a range of possible measures to deal with unsu
stainability. Again, these were organized into groups:

- Rights
- Transparent, participatory management
- Support to science
- Benefit distribution
- Integrated policy
- Precautionary approach
- Capacity building and public awareness
- Market incentives.

Workshop 2

This workshop directly led on from the previous one and thus focussed on the following major questions:

- What are the major obstacles to the implementation of major legal documents?
- What are the main lessons learned and the possible paths to solutions for improved implementation?
- What are the possible gaps that may exist in these instruments to guide the international community in improving the management of marine fisheries?

In organizing the workshop, the suggestion made in the first workshop of developing case studies was adopted. A set of eleven case studies was commissioned, each of which fitted into one of four broad categories of fishery:

- large volume small pelagics;
- tuna and tuna-like species;
- large volume demersals;
- coastal fisheries.

Most authors wrote their case studies according to a template established by FAO. This template used the six groups of factors identified by the Bangkok workshop as the basis for analysis. It posed the following key questions:

- Is fishery management achieving the four components of sustainability: bio-ecological, economic, social and institutional?
- Why is fishery management successful or not?
- Paths to solutions – how can difficulties and obstacles are overcome.

The case-study papers were initially presented and discussed in plenary. Participants were then organized into four sub-groups, each discussing one broad type of fishery from the list above.

The fishery-specific conclusions of each sub-group were presented to, and discussed in, plenary. On the basis of these discussions, the plenary reached general conclusions applicable to all kinds of fishery. Overall, the workshop tended to confirm the conclusions of the Bangkok workshop with a focus on few key points (Box 2).

The workshop also reached fishery-specific conclusions. These are remarkable for their similarity rather than their differences. All of the four groups identified issues of rights and governance as being at the heart of the problem.

Box 2: Points highlighted in Workshop 2

The problem of poor governance, including a lack of political will, as a key issue in fisheries unsustainability.

- The need for secure use rights
- The need for capacity building and information sharing
- The need to extend fisheries management beyond its biological dimension to include the economic and social dimensions
- The need to progress regionally and internationally in the implementation of international instruments.

Workshop 3

This third workshop was organized a little differently to the previous ones. Having identified in the previous workshops, the main factors of unsustainability, this workshop was organized on a thematic basis. The main themes, drawn from the conclusions of the previous workshops, were:

- governance and fisheries management (five papers);
- access and fishing rights (four papers);
- fishery management and sustainability dimensions (four papers);
- small-scale issues and developing country perspectives (five papers).

The workshop was organized on a one-theme-per-day basis. For each theme, the appropriate papers were presented and discussed. From these presentations and discussions, conclusions were reached concerning each theme. And having discussed the four themes, the workshop reached some overall conclusions (Box 3).

Box 3: Main conclusions of Workshop 3

Transition and reversibility
Moving from unsustainable to sustainable fisheries will involve planning for and meeting transition. In some cases, costs may be more than transitional. Where improved management implies permanent exclusion of some fishers, their costs must be taken into account.

A key feature of sustainability is reversibility or resilience. Such concepts require that a systems view be taken, rather than focussing on particular aspects. "Shock absorbers" need to be designed in order to allow the system to deal with shocks and uncertainties. Management needs to be adaptive.

Governance, access rights and tradeoffs
The workshop re-affirmed the importance of rights. It drew attention to the importance of the detailed nature of the rights and the system within which they operate. It is important to match rights to the scale of the activity.
The importance of good governance was also stressed.

Ecosystem and livelihoods approaches
The workshop discussed other approaches to the question of unsustainability. It was concluded that both the ecosystem approach and the livelihoods approach provided interesting entry-points to the problem, provided that they were sufficiently broadly defined.
The workshop re-affirmed the view of previous workshops that solutions to fisheries problems usually cannot be found solely within the fishery itself. Instead, an integrated view must be taken of the social, economic, and ecological systems, each interpreted broadly.

High seas governance
A fundamental issue is whether freedom of the high seas is compatible with sustainability because of the difficulty to deal with allocations. Another problem is the unwillingness of Nation States to delegate sufficient power to regional fishery bodies.

The workshop also put forward a number of broad recommendations and observations.

1. Even though achieving sustainability is highly case-specific, the process involved appears to be more general. It would be worthwhile therefore studying this process.
2. More attention should be paid to the costs of fishery management systems, including transition costs.

3. Fisheries management is inevitably a dynamic process. Problems will continue to arise even as current ones are resolved.
4. Systematic approaches to analysing fishery management should be adopted, including the development of indicator systems with suitable reference points for each indicator. These indicators should include the social, economic and institutional dimensions as well as the biological one.
5. A multi-disciplinary approach should be adopted, paying far greater attention to social science. Such an approach was felt to be particularly useful in the case of small-scale fisheries. Mechanisms should be established to set priorities for research and information gathering.

2. FORMALIZING THE IMPLICIT APPROACH

The brief review above of the three workshops enables the implicit approach to be identified. In essence, the approach has been to focus on the multidimensional nature of unsustainability. Multidisciplinary assessments have then been undertaken of:

- the factors of unsustainability;
- issues in implementing policy instruments and tools which aim at sustainability;
- possible paths to solution.

The aim of this section is to give a formal theoretical underpinning to the implicit methodological approach. From the workshop review, it is clear that the approach is based on an expert group. From a formal point of view, the methodological approach draws on three different group discussion techniques:

- the main underpinning is a modified Delphi technique; [3]
- brainstorming;
- nominal group processes.

The following sections outline each of these techniques. Most attention is paid to the Delphi technique since this is the key methodological tool. An assessment is then made of the way in which the project has so far applied this methodology and some suggestions are made for the future development of this project.

The Delphi technique

This section presents the general principles underlying Delphi-based methodology in order to evaluate the extent to which the project has used this approach and to provide a basis for suggestions for the future. The Delphi technique was initially developed in the 1960s and has developed into a group decision-making tool that is particularly useful in contexts where a group, or groups, of experts must reach some consensus of opinion concerning factors that have a large degree of subjectivity. It is widely used as a general tool to generate information and judgements from experts (participants) to facilitate problem solving, planning, and decision-making.

The Delphi technique works well in situations containing strong political or emotional elements or in situations where consensus must be reached between participants with strongly opposed views or coming from diverse backgrounds. The technique is very flexible and can be applied more or less formally in a variety of situations. The technique is designed to take advantage of participants'

[3] Modified, for example, because participation was not anonymous or because of the lack of formal steps to guarantee that nobody can overinfluence results by its status, personality or behaviour. In the workshop attended by one of the authors of this paper, these modifications did not seem to influence the process.

creativity as well as generating the benefits of group insights, while minimizing the disadvantages of group-based problem-solving, especially overdominant group members and lobbying.

Although best known for its use as an informal, subjective model when the decisions are based on opinion, the Delphi technique can be formalized if the data are, or become, available. One approach therefore might be to use the technique to generate hypotheses and identify priority areas for data collection. As the data become available the method can then be used to test objectively the hypotheses generated subjectively.

Overview of the Delphi technique

The Delphi technique provides a general procedure for defining key criteria and prioritising items that use those criteria. Given its flexible nature, the precise implementation of the Delphi technique varies from one situation to the next.

In a policy context, the basic aim is to allow the experts (or other participants, depending on the case) to produce a list of key issues or decision variables, and to rank them according to their subjective criteria. This ranked list is then provided to decision-makers, who may use it as it stands or apply their own criteria to it in order to generate decisions concerning policy development.

Generally, the process involves a small number of meetings of the expert group, associated if necessary with the use of questionnaires for important actors who are unable to participate in the meetings. In some cases, the technique is used without the contributors physically meeting, information instead being exchanged by e-mail. However, where the budget allows it better results are usually obtained from face-to-face discussions. The process can be broken down into a series of steps.

Identify a facilitator

The facilitator plays a key role in the process. Ideally, the person selected should not be a stakeholder in the outcome of the process. For this reason,.it is often suggested that an outsider be chosen.

Identify the panel of experts

The experts should be chosen because they have detailed knowledge of the issues at stake. In a general context, it is also helpful if they are familiar with prioritization techniques.

Draw up a list of key criteria

Brainstorming is usually used to establish a list of key criteria that all experts feel is appropriate to the issue being discussed. The idea is to be provocative and broad-ranging; it is not to seek the "correct" answer, indeed, at this stage there is no correct answer. Depending on the importance of the issue at stake and the time available, brainstorming may be undertaken at an individual level with each participant required to respond to a questionnaire, or at group level, or both. The key aim is to generate as many ideas as possible for dealing with the issue. The precise method used to generate the ideas varies from one application of the technique to the next. For instance, if a questionnaire-based approach is used, one variant is for the facilitator to collate all ideas generated from the initial questionnaire into a single document. This document is circulated to experts as a second questionnaire, asking them to refine existing ideas, comment on their strengths and weaknesses for addressing the issue, and to identify new ideas.

This process is then repeated until it is clear that no new ideas are being put forward, and that all strengths, weakness, and opinions concerning existing ideas have been identified.

Ranking the criteria

Sometimes, certain ideas are so dominant that the process can end at this stage. Generally however the process will generate competing ideas and some method must be found to rank them.

A number of variations exist around a common theme. Essentially, a numerical assessment is undertaken of the group's opinions of different ideas. Experts are asked to rank ideas on an arbitrary scale. Depending on the amount of detail available and the possibility for detailed evaluation, a shorter or longer scale can be used. For instance, a ten-point scale would offer the possibility of a very fine ranking of ideas, ranging from 1 (no potential for dealing with the issue) to 10 (very high potential for dealing with the issue). The key question is whether experts are able to distinguish meaningfully a 5 ranking from a 6.

A simpler approach is for the panel to rank each criterion as "very important", "of some importance", or "not important". These three categories are used by each expert to rank the list individually. Each category is given a numerical value; usually very important is 1, of some importance 2 and not important 3.

An alternative approach is for each expert to identify, say, the top four ideas, giving four points to the best idea, three for the next, and so on.

One drawback of the technique regardless of the scale chosen is that the numbers are used as if the cardinal category rankings were ordinal.

Calculate the mean and deviation

The mean and standard deviation are calculated for each item in the list. All items with a mean above the mean of the scale (2 for instance, if the 1, 2, 3 scale is used) are removed from the list. The remaining criteria are then placed in rank order. The list is distributed to the experts, who should then discuss the results paying particular attention to items with high standard deviations. Reasons should be found for the evident disagreement within the group. The expert panel is free if it so decides to reinstate items that have been removed because their mean exceeded.

Rank the criteria again

The ranking process above is repeated the number of times necessary for the results to converge. There does not have to be, and in practice never will be, complete agreement between the experts, but the consensus must be one that all are comfortable with. Sometimes, consensus can be achieved in only two repetitions, but depending on the importance of the issues at stake, decision-makers may insist on four or more repetitions before the results are considered reliable. Sometimes, more information is introduced after two repetitions with the aim of introducing new ideas or new criteria, or to improve the list.

Identify constraints and preferences

It is not possible to do everything, at least not at once. In any decision-making environment, the choice of what to do will be bounded by various constraints.

One important constraint to most problems is the available budget. For each possible decision, or course of action, some idea needs to be generated of the likely cost of implementing it. Where this is not possible, one approach is to allocate each expert with a number of points that can be allocated to different decisions. Clearly here the decision on budgeting will be at its most subjective, but at least experts are forced to consider the likely relative (or opportunity) cost of decisions. It would help if at least the budget constraint were known because in the above it is artificially imposed on the problem,

but this is less of a disadvantage that it may seem since in the absence of other information, the one thing that may be said with certainty is that there will be a budget constraint. This discussion illustrates well the way in which the Delphi technique is flexible between knowledge-poor and knowledge-rich situations.

As well as asking experts to take account of constraints to the decision-making process, it is usual also to ask them to rank decisions on the basis of their personal preferences (based of course on their professional judgement as to what it is important to do). As with the issue of constraints, the typical approach is to give experts a certain number of points to allocate between projects.

When a points approach is used, it is usual to allocate 70 percent of the number of possible decisions: if there are 100 possible decisions, each expert gets 70 points to rank decisions according to constraints and 70 according to preference.

Prioritizing projects by constraint and preference

Each expert ranks the decisions first by the constraints. The more important an expert feels a decision is, the more points he should award up to his total of 70 points (representing for instance the artificial budget constraint). Some decisions may receive no points. Each expert then does the same with the preference points.

Analyse the results

On the basis of the points awarded, a table of ranked decisions is produced and given to the panel of experts. The degree of consensus required must be decided on a case-by-case basis. Important, expensive decisions with widespread ramifications may be expected to require the most consensus. Where there are large differences in decision ranking, the reasons should be explained and the ranking process repeated.

Repeat prioritization process until the ranking stabilizes

Allow the minority opinion the opportunity to explain why they ranked decisions in the way that they did, then repeat the process. Once the ranking is stable, it can be presented to decision-makers.

Advantages and disadvantages

As with any technique, the Delphi technique has a number of advantages and disadvantages.

On the positive side, it can allow experts (or at least their opinions) to remain anonymous, and in this way it can reduce peer pressure, personality influence and individual dominance of the results. It is a relatively inexpensive technique. At the same time, it can provide reliable judgement of issues, provided of course that the experts involved are chosen well. It can be used to achieve consensus in situations where initial opinions are far apart or where groups are hostile to one another.

On the negative side, the judgements can only be those of the selected group of experts and they may or may not be representative of a wider constituency. By its very nature, the technique tends to eliminate extreme, but perhaps novel, ideas and force a middle of the road consensus. It requires adequate time and participant commitment.

Brainstorming

Brainstorming is a well-known technique that will not be discussed in great depth here. In the discussion of the Delphi technique above, mention has already been made of the use of brainstorming as a way of generating a list of issues.

Briefly, brainstorming is one among many lateral thinking techniques. It involves quickly generating as many radical ideas (or solutions to a problem) as possible. The aim is to go beyond normal thinking patterns to generate new ways of looking at an issue. Ideas should never be evaluated during the brainstorming but only once the session has finished.

Effective brainstorming requires a strong facilitator and recognition by the expert group of the purpose of the process. Otherwise, individuals may feel it too risky to propose suggestions that they fear will not meet with peer approval.

Because brainstorming is designed to generate many ideas, it must be followed by a narrowing, focusing activity that extracts a reasonable number of promising ideas for the group to work with.

One risk that must be avoided with brainstorming is when the expert group goes off on one tangent without exploring the full range of possibilities. One possible solution to this problem is to divide the group into two or more sub-groups, and ask each sub-group to brainstorm on the same topic.

In order to make brainstorming more effective, it may also be useful to associate it with another lateral thinking technique, for instance de Bono's six hats.

Nominal Group Technique

The Nominal Group Technique (NGT) is another group decision-making process for generating ideas and identifying problems. It shares some common features with the Delphi technique, enabling a ranked list of solutions to be developed through a combination of brainstorming and multi-voting by group members.

Once again the facilitator plays a key role in running the meeting and developing the final list of ideas based on the votes of the team members. It is recommended that groups be kept at a maximum of around 12 participants; where necessary sub-groups should be set up. A larger number of sub-groups, each with fewer members, may produce more ideas.

The technique begins with the experts writing down their ideas without discussing them with other members of the group. After an appropriate period of time, the facilitator goes around the table asking each person in turn to give one idea from their list. This process continues, again without discussion, until all ideas have been noted. It is at this point that discussion of the ideas should commence.

Each sub-group must develop a list of priority ideas. Groups should be left free to devise their own means for coming to a consensus on the top priorities, although usually some kind of voting procedure is used. From the discussion, the facilitator (usually assisted by a rapporteur) produces the ranked list of ideas.

Sub-groups then report back to plenary, giving their ideas and rankings, with explanation as appropriate. All ideas are then ranked by the whole group.

The advantages and disadvantages of this technique are similar to those of the Delphi. Its principal feature is that it allows equal participation by all experts and allows the facilitator to use an arithmetic voting procedure to establish the final group decision.

An expert technique well adapted to this kind of approach

Having reviewed, in section 1, the implicit approach taken in the workshops, it is clear that an expert-based group discussion methodology has been used. Having reviewed in this section, three of the most common group discussion methods, it is apparent that the project has not relied exclusively on any one technique. Rather, it has used a hybrid of the three techniques that nonetheless seems to depend most on the Delphi technique

The methodology underlying the project approach seems well chosen. The project involves a novel approach because most fisheries experts are used to approaching the problem from the sustainability point of view. Asking them to address it from the point of view of unsustainability involves a new mindset. It is effectively an exercise in lateral thinking.

One interesting result that emerges from reading the workshop reports of the project to date, especially the first two, is that unsustainability is something more than one minus sustainability ($U <> 1 - S$). It does therefore make a difference from which direction the problem is addressed. Teasing out precisely how the approach differs is not an easy task however. It is apparent in all the workshop reports, but perhaps especially in the third one, that not all participants managed to break away from the sustainability mindset. As a result, some papers fall back into the "standard" sustainability approach, in the sense that what the authors present would be largely the same whether the topic were factors of unsustainability or factors of sustainability.

One reason for this difficulty may be that the project is very ambitious. Not content with developing a new way of looking at the overexploitation problem (starting with the factors leading to unsustainability rather than with the goal, or constraint, of sustainability), the project has done so within the context of an expert group from a wide range of disciplines and cultures. It has sought to generate consensus amongst this group first on what are the factors and second on generic recommendations to deal with these factors. It has then sought to analyse the application of these generic solutions to a number of stylized fisheries.

Another reason may be found in the way that the methodology has been applied to date. It is noteworthy that the expert group has changed quite significantly from one workshop to the next. Within the Delphi-type methodology, such changes may be positive because they may help to generate new ideas. However, they require careful management; otherwise it may be difficult to maintain the focus on the new way of viewing the problem. There is perhaps some evidence that this problem affected the third workshop. It would certainly appear useful, insofar as possible, to stabilize the expert group for the rest of the project.

The expert group approach has followed fairly closely the Delphi approach, providing a method to identify key issues and to identify solutions. However the third workshop departed from the methodology and was arguably less successful as a result. This observation should not be taken as a criticism of the inherent quality of the papers presented at the workshop. All of the papers are of great interest, but they seem to fit less well into the factors of unsustainability framework. The subtle switch towards sustainability is particularly noticeable at this workshop. One reason for the problem, if it is perceived to be a problem, is that the use of case studies inevitably moves away from the general principles towards the detail. Possibly, there are too many case studies.

Further, it is necessary to take into account the fact that the project has not yet been completed. As a result, the methodology has so far only been partly implemented. Taken together the three workshops have developed ideas and a large amount of documentary evidence. They have only moved some of the way towards a synthesis of the results and so far, no attempt has been made to prioritize issues.

The next logical step appears to be to consider the prioritization of the issues identified in the previous workshops. This might involve looking at prioritization principles in general and applying them to the factors of unsustainability and the possible solutions. Fisheries management in practice is inevitably confronted with constraints, and it would be of interest to point managers towards the priority areas to be addressed. Case studies might then be used to assess the extent to which addressing these priority areas in practice has been successful.

Another development that would be of interest is to compare the way in which an unsustainability analysis addresses the management problem compared with a more traditional sustainability-focused approach. Again once the broad principles are established, case studies could be used to investigate the results in particular instances.

In brief, the methodological approach used in the project is a mixture of content and technique; content with the focus on multi-disciplinarity, technique with the focus on the expert-group approach. Interestingly, the main innovation seems to be the use of unsustainability as an entry point. This innovation is discussed in the next section.

3. AN ENTRY POINT TO AN "UNSUSTAINABILITY" APPROACH

Unsustainability factors: an original and constructive entry point

The initial concept of the project was to take unsustainability as an entry point and then examine its results through a modified Delphi process.

As noted previously, the analysis emerging from the workshops indicates that entry by the unsustainability approach allows to go beyond the "one minus sustainability" equation" (NS <> 1 – S). Perhaps the most important difference between unsustainability and sustainability is that they focus on different aspects of the same problem. Essentially, in analysing problems of fisheries management, there is an interrelated triangle of causes, consequences, and solutions. Contrary to logic, the analysis based on sustainability seems to lead to a focus on the consequences of unsustainability, whereas the analysis founded on unsustainability is based on causes, in particular, root causes.

The causes are broadly economic and institutional and, as a result, so are the solutions. The consequences, on the other hand, are broadly biological and economic. For example, in many cases, the poor state of fisheries resources could be identified as a consequence and as a secondary cause of unsustainability, but not as a primary cause in the sense that this poor state emphasizes unsustainability of the system but is not its cause.

The widespread use of the sustainability entry point with its focus on the consequences or the secondary causes has arguably been a hindrance to the development of rational fisheries management. From the viewpoint of fisheries management, the unsustainability entry point by focusing on the causes may be expected to lead to a more powerful analysis of the problem and to improved identification of solutions. Whether these solutions are implemented is, of course, another issue.

In this context, it is very interesting to note that the factors of unsustainability approach leads the multi-disciplinary groups at the workshops to a correct identification of the causes of the problem. In the case of workshop one, for instance, the factors are entirely economic or institutional in nature, except perhaps for the fourth one concerning inadequate knowledge, which certainly includes knowledge of the fish resource. Otherwise the fish resource is notable by its absence, whereas in any sustainability analysis it would almost certainly feature prominently.

Likewise the solutions identified are also largely economic and institutional in nature, except perhaps for support for science (a somewhat ambiguous recommendation, since it is not clear what different experts may have in mind by the term "science").

This is not to argue that the fish resource is unimportant. Rather the unsustainability entry-point places it in its correct context. It is the constraint on society's ability to achieve desirable goals from the fishing activity.

Beyond this interesting premise for re-examining and analysing the causes of an inefficient fisheries system, the results of the workshop suggest ways and bases to build an unsustainable methodological approach that can be transposed and applied to studies of specific cases.

The bases of an unsustainability approach

The analysis of the progress and the results of the workshop provide the basis for a sustainability approach. During Workshop 1, it should be noted that several common elements served as the basis of

analysis of the two groups of experts and is particularly important for the development of the approach.

Holistic model of sustainability

The two groups of expert[4] implicitly used a *common* and *holistic* model of sustainability that integrates four main aspects: (i) economic sustainability; (ii) ecological sustainability; (iii) social sustainability; and (iv) institutional sustainability.

This agreement on the model of sustainability is essential to identify the factors and the coherence of the analysis. It is obvious that within the framework of the workshops, this model was a result of both the multi-disciplinary nature of the group of experts and the very concept of unsustainability influencing the analysis of the causes.

Within the framework of an unsustainability approach, this model could be proposed as a framework for reflection, allowing for a holistic approach of the subject matter seeking application.

An approach leading to consensus

The two groups of Workshop 1, working separately, isolated the same types of unsustainability factors and possible solutions. Similarly, during Workshop 2, it was noted that the conclusions of different groups shared more similarities than differences. Generally, the contributions from the workshops were marked by a certain degree of *converging viewpoints* and a *consensus* that was relatively easy to reach, which is something quite rare.

The experience indeed showed that in the approaches favouring the sustainability viewpoint, the expert opinions on the analysis of situations, but even more so on the solutions to improve management, more often differed than agreed.

The unsustainability approach seemed to provide certain fluidity to thought leading to a convergence of analysis and a consensus on the solutions. This interesting empirical nature could be put to the test during the testing phase of the approach on concrete case studies.

A typology and hierarchization of unsustainability factors

The workshops drew up a list of many factors of unsustainability, divided into six major groups:

- inappropriate incentives, including market distortions (incentives to fishers that promote unsustainable practices);
- high demand for limited resources;
- poverty and lack of resources;
- complexity and lack of knowledge;
- lack of governance;
- interactions between fishery sector and other sectors, and with environment.

The relevance of these groups was tested during Workshop 2 by applying case study analysis. The results confirmed this relevance and allowed to propose a first hierarchization of the types of unsustainability factors. Nevertheless, this hierarchization shows a global trend and is not of a normative nature. It was therefore stressed that, case per case, if the nature of the factors hardly vary from one example to the next, the respective weight of each factor was indeed variable.

[4] One group using a matrix approach, the other a PSR approach (Pressure, State, Response).

A synchronic and diachronic analysis of problems and solutions[5]

In addition to the identification of unsustainability factors, the project directly deals with the issue of solutions, more specifically, the link between identifying the factors and identifying the solutions for better management. The aim was not so much to invent new solutions as to (i) verify if the range of existing solutions allowed covering the factors identified; and (ii) see how the most appropriate solutions could be identified in order to mitigate or neutralize the impact of these factors.

From a methodological point of view, the two groups formed during the first workshop adopted a different method to deal with the question of the link between the identification of factors and the identification of solutions. These choices highlighted the relevance of using two complementary frameworks for developing an unsustainability approach.

Group 1 developed a matrix allowing to better determining the link between the unsustainability factors identified and the choice of an appropriate response within a dynamic perspective of the factors/solutions relationship. Group 2 probed the potential contribution of an existing methodological framework allowing for a detailed identification of unsustainability factors in order to specify all the elements that had to be taken into consideration in drawing up solutions.

Group 2 used the driving forces-pressure-state-response (DPSR) framework to identify the factors of unsustainability. This framework allows investigating the causes of a state of unsustainability at a given moment by identifying the direct pressures and the underlying forces that explain this state. Pressure and underlying forces are also factors of unsustainability to be taken into consideration in choosing an appropriate solution. This group therefore opened up a new direction in methodological reasoning on how to approach the synchronic analysis of unsustainability factors, which include identifying the unsustainability factors and the groups of possible solutions.

Group 1 developed a matrix aimed at making a quick evaluation of how adequate a response is to a given factor, taking into account both the impact of this measure on the four aspects of sustainability and of the new factors of unsustainability that could result from the adoption of the solution envisaged. This approach therefore offers an anticipative approach to the factors/solutions included in a dynamic analysis of fisheries.

The use of two methodological approaches seems particularly relevant for carrying out an analysis of unsustainability and its possible solutions that is both factual (synchronic) and anticipative (diachronic) and to develop tools to hierarchize the solutions, taking into account the dynamics of the fisheries system.

The object of analysis: a pragmatic and flexible approach

During the first workshop, the two groups were faced with the problem of defining where to focus the application of the methodological framework to identify the unsustainability factors and solutions. The two groups once again chose different directions. Group 1 tested the relevance of factors identified with geographical units (coastal area, exclusive economic zone [EEZ], high seas). The second group applied the DPSR framework to fisheries representative models that would combine production methods and management measures (artisanal fisheries, industrial fisheries). From this first workshop, it appeared that the subject matter had to be better determined in order to perfect and test the first results obtained.

The second workshop served to test the results of case studies in order to evaluate relevance according to a typology that combines types of resources and types of fisheries in an approximate manner.

[5] This phenomenon may be interpreted in two ways: as it occurs at a given time (synchronic) or as it develops or changes over time (diachronic).

- large volume small pelagics;
- tuna and tuna-like species;
- large volume demersals;
- coastal fisheries.

The third workshop did not provide a new element concerning the need to more precisely classify a predefined subject matter.

It seems, therefore, that the unsustainability approach, as it has been developed to date, does not require a priori to define the subject matter, but would be adaptable to a wide range of sample units, thus revealing a certain amount of pragmatism in its approach. It would nevertheless be methologically relevant to analyse to what extent the choice of unit observed influences the results of this approach.[6]

4. RELATING THE UNSUSTAINABILITY APPROACH TO EXISTING METHODS

This section compares the approach taken in the Factors of Unsustainability project with that adopted in other methods that seek to conduct similar assessments or analyse similar issues. Many such methods exist. This section looks at SWOT analysis, rapid appraisal, systems-based analysis and policy, institutions and processes (PIP) analysis. It should be noted that each of these alternative methods is presented only very succinctly. It is hoped that over-simplistic presentations of the alternatives have been avoided, but this is not easy to achieve given the wide-ranging nature of the other methods with their many variants and interpretations.

RAPID APPRAISAL TECHNIQUES

SWOT analysis

Outline

SWOT analysis (Piggin, 2003) is a technique designed to audit an organization and its environment. It operates by undertaking an analysis of the internal and external environment facing the organization. Internal factors are classified as strengths (S) or weaknesses (W), and external ones are classified as opportunities (O) or threats (T).

Initially developed to provide a critical analysis of company marketing strategies, SWOT analysis has been extended to cover a wide range of issues, including for instance assessing the management framework of economic sectors such as fishery, forestry or agriculture.

In a planning context, a SWOT analysis helps to formulate key issues in assessing an organization or a sector. In this way, it provides information that is useful in the development of strategies to match the system's resources and capabilities to the environment in which it operates (cf. the SWOT matrix).

SWOT Matrix

	Strengths	Weaknesses
Opportunities	S-O strategies: identify and pursue opportunities that are a good fit to the system strengths	W-O strategies: develop ways to overcome weaknesses in order to pursue opportunities
Threats	S-T strategies: to identify and pursue means for the system to use its strengths to reduce its vulnerability to external threats	W-T strategies: establish a defensive plan to prevent weaknesses from making the system highly susceptible to external threats

[6] For example, by applying in a given country the approach separately to a fleet segment (e.g. small scale fleet) and to a fishery (defined as the fleets harvesting a given resource).

Advantages and disadvantages

A SWOT analysis is a quick and simple tool to use that adapts well to a range of situations (e.g. individual fisheries or the whole fishery system) and to a range of methods (including participatory research, bottom-up analysis or stakeholder group discussions). It can often provide a good starting point for discussion and help to identify the main issues, classifying the strengths or weakness, opportunities or threats to the system. It also provides a means to bring together findings from a range of background data and discussions.

However, the method is based on subjective individual analyses and it therefore requires broad consultation of interested parties in the system. This tends to reduce its usefulness for dealing with problems that have a very broad scale or where the number of interested parties is large.

The method tends to be useful as a first approximation to a problem focusing on the key issues, but it needs to be used in connection with other methods to refine the analysis, especially to fill the gap between identified issues and their causes. Moreover, while the simplicity of the technique is an advantage it also means that the SWOT framework has a tendency to oversimplify problems. And the simplification may become a drawback when a system is too complex with a large number of factors because the reducing issues to such a simple framework may render it impossible to develop a clear assessment of factors.

Finally, by its very nature, the method classifies factors as strengths or weaknesses, or as opportunities or threats on a somewhat arbitrary basis, technological change for instance may be either a threat or an opportunity or both depending on the circumstances.

Comparison with factors of unsustainability approach

There are some similarities between the two approaches, most notably in the use of subjective assessment based on expert groups. Both seek to identify key factors and strategies that might be adopted to deal with them.

The underlying logic of the SWOT method was used by group 1 from the first workshop to identify unsustainability factors. The group actually relied on the differentiation between internal and external factors: the external factors were defined as those having an impact on fisheries but on which fisheries have little influence (one-way effect); the internal factors are those on which fisheries have a wide influence while fisheries have an influence on them (*two-way interaction*).

Nevertheless, on the one hand it can be observed that most unsustainability factors identified and selected are internal, while on the other, the approach based on unsustainability factors focuses particularly on the weaknesses and threats units of the SWOT matrix, therefore neglecting a whole part of the analysis.

The SWOT approach, although being "expert", focuses on evaluating problems and developing a strategy towards a narrower and unsynchronized range compared to that covered by the unsustainability approach. It does not therefore seem to be the most appropriate one to be used in the factors identification phase within the unsustainability approach.

Rapid appraisal

Outline

There is a wide variety of rapid appraisal techniques. (See, for example, Chambers, 1992; Townsley, 1996; Pido *et al.*, 1997.) The aim of this method is to obtain qualitative information about an area in a fast and succinct way. It uses available information about the area and key local people to obtain the

views of their community. Rapid appraisal can be used to provide a quick insight into the issues affecting an area and the priorities for change. It can also be used to examine a specific topic. It ensures early involvement of stakeholders in proposed programmes.

Rapid appraisal proceeds by first collecting data from existing written sources. Then "key informants" are recruited to help obtain the views of stakeholders. Key informants are local people who have a good knowledge of the local area. The final stage of the process is a validation workshop, which provides an opportunity to get feedback on findings and identify any remaining gaps. Although rapid appraisal is a fast process, it involves a great deal of time commitment over a short period.

Certain characteristics are common to all rapid appraisal methods. For instance, triangulation is used to reduce bias that can distort research results and to increase the database. All rapid appraisal methods also rely on a wide variety of tools and techniques to gather information, rather than relying exclusively on pre-established questionnaires including mapping exercises, diagrams, ranking activities and semi-structured interviews.

One important difference between rapid appraisal techniques is the question of who does the research. In rapid rural appraisal, the research process is mostly managed by outsiders. Typically, a multidisciplinary research team determines the objectives for the study, conducts the research in the field, has the principal responsibility for analysing the results, and often decides what ultimately happens to the information. This contrasts with participatory rural appraisal in which the local community manages the research process. The outsiders' role is limited, initially, to providing training in the methods and, later, to facilitating (as needed) their use. Between these two extremes, there is a wide range of options in which outsiders may initiate the process but then ask the local community to select several representatives to join their team as active members.

Advantages and disadvantages

Adopting a bottom-up approach and relying on wide-scale stakeholder consultation, rapid appraisal methods tend to have similar advantages to SWOT analysis. They provide a good forum for discussion and help to identify the main issues. They also provide a means of bringing together findings from a range of background data and discussions. In particular, they represent a way of ensuring that stakeholder concerns are expressed and, it is hoped, taken into account in policy development.

Once key issues have been identified directly by stakeholders, they can be further analysed. Rapid appraisal is more holistic than a SWOT approach because it uses a wider range of tools to discuss and consolidate the database and to identify and discuss key issues.

However, rapid appraisal techniques are not as quick and easy as SWOT methods and require more commitment and individual involvement from participants at all levels.

Because rapid appraisal requires close proximity with the subject over a short period of time, such methods are most appropriate for the analysis of issues at a community scale or to investigate a very well defined topic. As the scale broadens, the methods tend to lose power. It would be difficult for example to use the approach to assess the sustainability of a large marine ecosystem.

Comparison with factors of unsustainability approach

There appears to be relatively little overlap between the two approaches. A rapid appraisal approach is typically focussed on stakeholders in a well-defined community or geographical area. The factors of the unsustainability approach seek to identify key issues and solutions on a much broader basis. It would seem to make the most sense, therefore, to regard a rapid appraisal approach as a means of identifying in detail one possible dimension of the unsustainability problem.

SYSTEMIC-BASED ANALYSIS

Systemic analysis

Outline

Systemic analyses were fully developed at the end of the 1980s and the beginning of the 1990s. The fisheries sector largely profited from the conceptual advances made, in particular, in the agricultural field. The reference to "fisheries system" is today almost systematic, even if a complete analysis of the systemic type is carried out less often.

The systemic analysis is a model framework that focuses on the identification of processes and interactions. The fisheries system is therefore defined as a "group of coordinated elements that are dynamically interacting and involving levels of hierarchized decisions, organized by man with the aim of developing fisheries resources (Rey *et al.,* 1997). Various models of the fisheries system coexist, in particular, those provided by Rey *et al.* (1997) and de Charles (2001).

In the natural (ecosystem)-social interface, Rey *et al.* (1997) distinguishes two hierarchized systems, the productive system and the regulation system, and a cross-cutting system, the management system.

Charles (2001) articulates the fishery system around its structural components: the natural system (fish, ecosystem, biophysical environment), the human system (fishers, the post-harvest sector and consumers, fishing households and communities; social/economic/cultural environment, the fishery management system (fishery policy and planning, fishery management, fishery development, fishery research).

Advantages and disadvantages

The systemic approach is an obvious conceptual contribution for representing and understanding fisheries and its management. Nonetheless, applying this approach poses some problems.

The crux is the definition of the system. To a large extent, the definition is empirical, depending on the data available and the ability of theoretical structures to provide meaningful interpretations of the data. The definition also depends on the use to which the analysis is to be put and on how the analysis be used.

The systemic approach is holistic by nature and does not offer a specific entry to narrow the field of research. The way it is carried out presents an obvious problem of costs to cover data or analyses. This type of analysis also demands a great deal of time, which is not necessarily compatible with management requirements. Finally, the relevant definition of the fisheries system will be a compromise between what is desirable and what is feasible.

A broad systems-based view is perhaps also best at identifying and examining inter-relationships between issues than at identifying the key issues themselves (except of course to the extent that the interrelationship is the issue, as underpins the ecosystem approach).

Comparison with factors of unsustainability approach

There is no conflict between a systems approach and factors of unsustainability approach. The latter is one particular way of looking at the fishery system. In order to proceed, the factors approach must, implicitly or explicitly, define the fishery system that is being analysed from an unsustainability perspective. A model of the systemic type could be used, for instance, to better envisage the issue of the overlapping results between factors of unsustainability and factors of sustainability and their

solutions, that is, in order to improve the anticipative analysis that one of the groups of Workshop 1 had begun based on a matrix.

Specific cases of ecosystemic analysis

The ecosystemic analysis is a variant of the systemic analysis centred on one of the components of the system, as defined in the global approach: the ecosystem. In essence, the ecosystem approach extends the analysis of the fishery beyond the target species. In this way, it attempts to take into consideration the impact of fishing on non-target species, whether or not of commercial interest, and also the impact on lower trophic levels (e.g. Sinclair and Valdimarsson, 2003).

The ecosystem approach itself may be criticized for extending the fishery system in only one direction. In its current development, it tends to lightly take into account the interactions and processes with the other components of the fisheries system as a whole. The interactions that are evident between the fish stock and its environment are equally evident in the case of the resource users and their environment. Moreover, the fishery management process is itself a system.

INSTITUTIONAL/GOVERNANCE ANALYSIS

Policy, institutions and processes (PIP) analysis

Outline

Policy, institutions and processes (PIP) analysis (e.g. Hobley, 2001) is one dimension of the Sustainable Livelihoods (SL) framework. Although it is only one dimension, it covers a vast range of topics since it is concerned with the policies and institutions that determine the social and institutional context within which livelihoods are constructed, and the processes of change in these policies and institutions.

The elements of PIPs operate within the broad governance environment, including the macro-micro linkages and the relationships between the state, private sector, civil society and citizens.

PIP analysis includes:

- the formal and informal organizations at all levels that influence people's lives;
- the services people receive;
- the policy environment;
- the structure of incentives;
- the rules of the game and power relations that govern people's lives;
- processes to enhance downwards accountability and to respond to the needs of citizens.

Among important issues included in PIP analysis are:

- **Decentralization**

Decentralized approaches are usually seen as essential to match poor people's preferred outcomes and strategies with appropriate service delivery.

Governance

Effective governance is interpreted as getting policies right (consistent and implemented) across a range of levels and coherence between policies.

- **Organizational change**

Organizational change of government departments is seen as a key element to develop structures in which poor people can get better access to services.

- **Tools for understanding PIPs**

New Institutional Economics (NIE) is seen as an analytical framework for examining the importance and effects of policies, institutions and processes that make up the formal and informal institutional environment. In particular, NIE is expected to provide an understanding of the reasons for and effects of different institutional arrangements (for instance, on the way that changes in technology, infrastructure or policy can impact on people's livelihoods).

Advantages

PIPs analysis provides an essential part of an SL approach since it provides the link from the macro level down to the micro level that is the key entry point for SL. In addition to providing an analysis of the impact of key policies, institutions and processes, the PIP approach allows key questions to be identified and addressed, such as following:

- What is the appropriate role of the state, NGOs and the private sector in service provision?
- How can strengths of existing institutions and organizations best be built upon, rather than inventing new structures?
- How can informal institutions best be addressed?

Disadvantages

It is impossible to deny that PIP analysis deals with an important area. A weakness, however, is the very vastness of the topics to be addressed. The result is that the approach is fairly successful at identifying the main questions, but far less so in designing practical approaches to deal with PIP issues.

Despite the appeal to the New Institutional Economics, the PIP approach seems to have no overall theoretical framework. This may be one factor explaining its success in identifying important topics but its difficulty in going beyond this.

It is striking also that the PIP approach pays little if any attention to the market as a key institution.

Comparison with factors of unsustainability approach

Once again, there is no conflict between this and the factors of the unsustainability approach. The unsustainability approach also identified poor governance as a factor of fisheries unsustainability. It may be relevant to see if the PIP approach combined with the unsustainability approach for determining and limiting the field would allow to determine the aspects of governance, which are unsustainability factors within the framework of a case study. This approach is actually used to complete analyses, for example, in the approach relating to sustainable livelihoods.

Summary

Most of the above-described methodologies maintain more or less direct links with the underlying approach of the project. Some of them could be partially used to develop some phases or to clarify some aspects of the unsustainability approach, in particular, the systemic approach and the PIP analysis.

5. COMPARISON WITH APPROACHES USED FOR INTERNATIONAL PROGRAMMES, BOTH RECENT AND IN PROGRESS

In this section, the unsustainability approach is compared to two other global approaches used to carry out projects at the international level: the approach relating to sustainable livelihood and the TDA applied to GEF.

Sustainable livelihoods approach

In general, the sustainable livelihoods (SL) approach aims to reduce poverty by bringing about a sustainable improvement in the livelihoods of poor households and communities. The SL approach provides a framework for mapping and understanding the various components that influence the livelihoods of households and communities in order to develop a strategy for capacity building. "A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base" (Carney, 1998).

A major implementation of the SL approach in fishing is the FAO/DfID Sustainable Fisheries Livelihoods Project which focuses on small-scale fisheries in West Africa and aims to improve the livelihoods of fishing communities and ensure the sustainable utilization of fish resources.

The SL approach focuses on five key elements: vulnerability, capital assets, transforming structures and processes (i.e. PIP), livelihood strategies and livelihood outcomes. As the discussion of the PIP element above shows, each of these five elements involves a significant amount of analysis. The capital assets element, for instance, is represented by the famous pentagon composed of: physical capital (basic infrastructure and production equipment, and means that enable people to pursue their livelihoods), natural capital, social capital (networks, group membership, relationships based on trust, access to wider social institutions), financial capital and human capital (skills, knowledge, work skills, good health).

The approach is holistic, based on a multidisciplinary analysis of development issues, and on the inclusion of grassroots communities in the execution of development projects. It aims to identify the likely impacts of projects, both on the target beneficiaries and on the livelihoods of others in the community.

The SL approach starts from the hypothesis that sustainable poverty reduction cannot be achieved through work at the macro level only, but rather it requires specific interventions at the grassroots level as well, and also on the linkages between the various levels in the system.

The SL approach has some similarities with the factors of unsustainability approach, in particular the emphasis on multidisciplinarity. However, the two approaches appear to be defined more by their differences than by their similarities. To begin with, the factors approach seems more general since it includes small-scale fisheries as one case, whereas the SL approach focuses on such fisheries.

Even in the case of small-scale fisheries, the two approaches are significantly different. The entry point for the SL approach is poverty alleviation. The underlying hypothesis is that fishing households and communities are poor and that fisheries can be managed in such a way as to relieve the poverty by

Table 1: Summary of advantages and weaknesses of above-described methodologies

Type	Name	Subject matter	Format	Main advantages	Main weaknesses
Rapid appraisal	**SWOT** (Strengths, weaknesses, opportunities, threats)	Management framework (enterprise or sector) Adaptable to many subjects	Expert or participative analysis	Fast and easy to implement Allows for rapid formulation of problems Good organizing tools	Tendency towards simplication Arbitrary classification of problems identified Difficulties in connecting the threats and weaknesses identified to the causes Difficulty in reducing the subjectivity caused by lack of specific methodology

Type	Name	Subject matter	Format	Main advantages	Main weaknesses
	Rapid appraisal	Region (privileging a cross-sectoral approach)	Participative (with various degrees, according to the formats)	Allows to obtain qualitative information quickly and succinctly Allows for a good grasp and mitigation of problems from the point of view of different stakeholders Holistic and pragmatic	Methodology needing an important investment of different stakeholders rapidly. Needing to be extremely close to the site, poorly adapted to the levels other than the community level
Systemic analysis	Systemic	Systems (defined according to a sectoral basis or other	Expert analysis	Holistic Allows to find exactly the links and dynamics between the elements and between levels of a system	Difficulty in determining the limits of a system "Heavy" methodology, requiring time and important investment
	Ecosystemic	System defined according to an ecological operational logic	Expert analysis	Has quite similar advantages to the global systemic approach but limited to the ecological field	Difficulty in establishing the link between the ecosystem and the socio-system in the more developed forms to date
Institutional analysis	PIP	System of governance (policies, institutions, processes)	Expert analysis	Allows to analyse in detail and to bring out the problems linked to the system of governance Allows to analyse the institutional processes between the micro and macro levels Allows for a good analysis of links between different stakeholders of a system, which includes the institutions	A non-holistic approach that targets a speific aspect of the problem Non-holistic approach that targets a particular aspect of the problem An analysis that is thorough but heavy time-wise on issues of governance and lacking a focal entry point to identify the problems

improving SL. The entry point for the factors of unsustainability approach is the hypothesis that fisheries are currently poorly managed and that if the factors that lead to unsustainability can be identified, solutions can be found to improve the situation.

Because the objectives of the two approaches are very different, it is important to be clear about what is to be achieved before deciding which kind of analytical framework to adopt.

Using the two approaches to evaluate the same policy objective is likely to result in significantly different analyses. Consider the question of poverty alleviation in small-scale fisheries. How does the SL approach proceed? Because the approach is very general, there is some risk of characterizing it unfairly, but by and large, it focuses directly on fishing households and communities. The vision is one of small-scale fisheries as independent management units. The fact that they are usually exploiting the same resources as other larger-scale fishers is left aside, or perhaps dealt with under the vulnerability or the PIP analysis.

The factors approach on the other hand takes a system view. It is not concerned with the question of small-scale fisheries per se but with their role within the system. The activities of small-scale fishers, because of the general difficulty of controlling their fishing capacity, may in fact be a significant factor of unsustainability. The factors approach is more likely therefore to draw attention to the need for control of small-scale fisheries. The approach will emphasize the natural limits imposed by the productivity of the resource, and the question immediately arises as to who is to be allowed to fish and

under what conditions. Because of such limitations, the issue of poverty alleviation would have to be addressed beyond fishing households and communities by looking at the general question of how the implicit resource wealth is to be used. This could involve poverty reduction for fishing communities, but it could also involve poverty reduction more generally in coastal areas or throughout society at large, depending on the scale of the fish resource available and on the policy objectives adopted.

The more general nature of the factors approach also allows it to deal with the case where it is the small-scale fishers who have the comparative advantage. Here, the main challenge for such fishers is to ensure that they are part of the overall management system and that use rights systems are defined in such a way that they can be transferred from larger-scale fishers to smaller-scale ones. The question of the adjustment mechanism is crucial in this case. How can small-scale fishers acquire rights from other fishers if they are not part of the same management process?

The SL approach seems to start from the position that small-scale fishers must be protected in some way. This may be the case for some such fishers, but it is an empirically-testable hypothesis that is certainly not true of all small-scale fisheries. The approach also seems to ignore the fact that often the relevant geographical scale of fisheries management interventions goes beyond the geographical scale of small-scale fisheries.

Another difference between the unsustainability and SL approaches is that, at least in its current implementation, the former is expert-based, whereas the latter is participative. This difference arises once again from the different entry points of the two approaches.

In deciding then which approach to adopt, it is important to identify entry points and objectives. If the aim is to improve the livelihoods of local fish dependent communities, then an SL approach will be the most appropriate. If on the other hand the aim is to improve fishery management systems then a factors of unsustainability approach will be more appropriate. However, this apparent conflict should only occur in the short term. In the medium to long term, both entry points should result in improved livelihoods.

The discussion here suggests that there are significant differences between the two approaches. Overall it seems clear that they are complementary rather than overlapping.

Transboundary Diagnostic Analysis/Strategic Action Plan (Tda/Sap)

The TDA is used by the Global Environment Facility (GEF), a joint initiative with the World Bank and the United Nations. The TDA is a technique developed by using a complete series of steps ranging from a definition of problems to the implementation of actions to correct identified problems.

As its name indicates, the TDA aims at identifying and solving issues with important transboundary aspects, therefore highlighting the issues of scale. Although it could be applied to various subject matters, it is most used for environmental or natural resources management issues such as water.

The TDA approach includes three phases: (i) project development; (ii) implementation of the TDA; and (iii) preparation of the strategic action plan (SAP). Phase I allows to determine which issue to treat, identifying and organizing all the stakeholders in order to ensure their participation and support for different stages of the project and therefore integrating the results. The phases that concern us the most for comparison with the unsustainability approach are phases 2 and 3, which aim at identifying the problems, determining the causes and proposing the appropriate solutions.

[6] Transboundary Diagnostic Analysis and Strategic Plan of Action.

Implementation of the TDA should allow, in six stages[7] on the one hand, to identify, quantify and prioritize the transboundary issues and, on the other, to identify their causes.

The approach proposed is to identify the problems, evaluate their importance (scaling), determine their time and space scales (*scoping*), then prioritize them (*screening*) by classifying them into high, medium and weak priority. To achieve this, the TDA suggests using an expert Delphi technique.

The environmental and social impacts of the problems classified into high and medium priorities are then identified and quantified (as much as possible with the assistance of indicators) with the participation of stakeholders concerned.

The causal chain of the problems into high and medium priorities in the end is analysed in order to determine the immediate, underlying and deep causes. In the case of environmental issues, which concern GEF, the immediate causes are generally technical; they could be quantified, prioritized and located geographically. The underlying causes are, rather, of an economic and social nature. In the case of water management, a sectoral type of analysis has already been used successfully (*Dnipro Basin*), but different approaches could be envisaged according to the case study.

The deep causes are often of another nature: they could be macroeconomic, demographic, linked to consumption cycles or even democratic processes. Within the framework of the TDA/PSA approach applied within GEF, most of them are considered beyond the capacities of GEF actions. They should nevertheless be subject to a precise identification in order to understand the entire causal chain.

The PSA phase in its turn aims at formulating solutions to respond to issues identified by the TDA. It goes through a phase of formulating general objectives on the basis of a transboundary diagnostic analysis, and then formulates possible options where feasibility must be analysed. Before being validated, these phases are always discussed with stakeholders at the appropriate level. Finally, the implementation plans are developed (operational objectives, institutional framework, monitoring, evaluation indicators, etc.).

Many similarities can be observed between the TDA/PSA approach and the unsustainability approach. First, both resort to "expert" techniques in the key stages of the process: identification of problems and identification of solutions. In both cases, expertise is multidisciplinary. In the TDA, this is supported by a participative approach that allows to find an analysis and solutions that can be used by different stakeholders. The unsustainability approach, which is only a rough draft, has not yet envisaged this particular aspect.

Further, the two approaches highlight the importance of correctly identifying the causes (even for those which are difficult or impossible to take action on) in order to be able to formulate adequate options.

The difference between the TDA/PSA approach and the unsustainability approach is first of all, a difference of entry point. The TDA approach focuses on transboundary aspects of a given issue, whereas the unsustainability approach concentrates on a group of aspects regardless of their nature.

For fisheries management, the transboundary issue is not necessarily essential. It could be a negligible element in some cases or absolutely significant in others, such as for shared or highly migratory fisheries management. Further, this type of analysis has already been used in fisheries in support of the actions of regional fisheries organizations, for example, by the General Fisheries Commission for the Mediterranean (GFCM) in 1997.

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[7] (1) Scale, scope and screen issues/problems; (2) Analyse the consequences and impact of issues/problems; (3) Analyse the origin and causal link of issues/problems identified; (4) Integrate these elements in a draft TDA; (5) Discuss the TDA with primary stakeholders identified earlier in the process; (6) Revise and adopt the TDA.

In addition, the point of departure for unsustainability presents the issue of causes and the link between problems and causes straight away, therefore making expert analysis a question of dynamics. This is represented by the use of the DPSR framework during the first workshop. In other words, the sequential analysis proposed by the TDA[8] is short-circuited by directly focusing perspectives on the analysis of causes as close to the source as possible. This seems to have repercussions on the type of causes to which the two approaches offer solutions.

In the case of TDA applied within GEF, the immediate causes and the underlying causes are prioritized, the deep causes being generally beyond the scope of the project. The unsustainability approach applied to fisheries more specifically targets the underlying causes and the deep causes.

The two approaches also differ in the methods proposed for choosing possible solutions. The TDA approach bases these choices on a feasibility analysis of the options, which includes economic feasibility (cost benefit, cost efficiency) and social and political acceptability. On the other hand, the unsustainability approach has begun to develop a scale of relations of the factors and solutions that highlight the impact of the solution on the four dimensions of sustainability (impact analysis), but also on the collateral emergence of new unsustainability factors. This approach is part of the systemic vision of fisheries in taking into consideration the constant dynamics of unsustainability factors, certain aspects of which are known today. It therefore integrates an anticipative aspect in the selection process.

The two approaches therefore have slightly different aims but great similarity in the techniques used during the different phases. Using one or the other depends on the issue concerned. It is also conceivable that they could draw from each other in order to deal with certain aspects or to develop variants in carrying out certain phases according to need.

6. APPLICABILITY

The review undertaken here suggests that the approach taken in the factors of unsustainability project is a useful addition to the tools available for the analysis of fisheries management and policy. The factors approach seems to have wide potential applicability. At present, the focus of the project has been on international fisheries instruments. The approach seems very well suited to this purpose since it enables broad issues to be identified that are appropriate to international solutions.

However, the potential applicability of the approach goes well beyond the current usage. Because it forces analysis to focus on the causes of the fisheries problem, the approach seems well suited to analysis at all levels of the fishery problem. Application of this approach to the analysis of country-level fishery management strategies and to the management of individual fisheries within the strategic framework seems likely to produce a clearer identification of the problems and possible solutions.

Perhaps the real innovation in this project, however, is simply to have looked at the flip side of sustainability. As indicated in the text, this had not been done before, and it has allowed a better identification of the causes of unsustainability.

One of the possible follow-ups of this project would be to refine the approach to test these types of utilization as if they were expert approaches for fisheries management. The following actions are suggested:

1. Refine the unsustainability approach, in particular:

   - refine the analysis grid of the unsustainability factors;

[8] Identification of issues/problems, ranking and validation; then identification of impacts and validation; then identification of options and validation.

- refine the matching framework of factors and solutions. This could lead to develop a technique of hierarchization, using the collateral unsustainability factors as criteria of hierarchization of preferences, and feasibility parameters as criteria for identifying constraints;
- clarify the issue of the subject matter to which the expert system will be applied.

2. Test the approach thus formalized on limited number of case studies.

3. Finalize the approach in the form of a user guide for managers.

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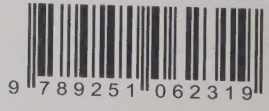

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